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# AMERICAN JOURNAL OF

## **OPHTHALMOLOGY**

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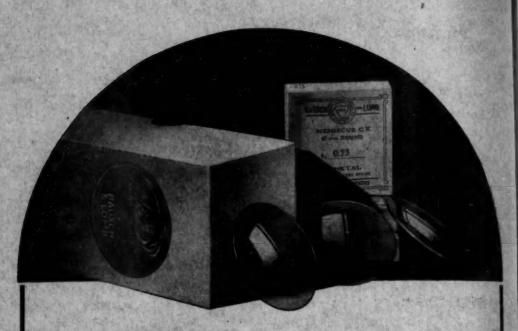
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### AMERICAN JOURNAL OF OPHTHALMOLOGY

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No. 5

### LOCALIZATION OF A FOREIGN BODY IN THE EYE IN RELATION TO THE ROTATION CENTER.

A. VERWEY, M.D.

JOHANNESBURG, SOUTH AFRICA.

A foreign body in the eyeball may be localized by X-ray with reference to the center of rotation, instead of a fixed point in front of the cornea. In this method, the eyeball is rotated and a second exposure made on the same plate, instead of making two exposures with a change of the position of the tube. The mathematic basis of this location by rotating the eye is here explained, with a brief statement of the method for such location in practice. Absence of movement of the foreign body or great disparity between the movement and its apparent position, indicates that the foreign body is outside the eyeball, so that its position remains unaffected or but slightly influenced by the ocular movements.

The need of an exact localization of a foreign body inside the eye will be seldom felt, if one has at one's disposal a giant magnet and prefers the extraction of the corpus alienum by an opening in the anterior chamber. In some cases, however, chance of injury of the lens or ciliary body will be less by making an aperture in the sclera on the proper spot, but in this condition exact localization will be necessary.

Sweet's well known method depends upon the determination of the distances in relation to a small leaden ball, placed just 10 mm. above the center of the cornea. The distances of this ball from the sensitive film and from the Coolidge tube are fixed; likewise the extent over which the tube is moved for the second photo. By this device the distances in the three dimensions in relation to the leaden ball may be read off directly from a special chart.

In the following paper a method will be described by which is taken as point of reference the rotation center of the eye, which may be considered as practically fixed.

At the International Ophthalmological Congress, held in Utrecht in 1900, Hoffman gave suggestions on this subject and Lehman and Cowl wrote a paper concerning this method in the Centralbl. f. pr. Augenh. in 1902. Recently the technic of radiography has so far improved, principally by the use of a film with a sensitive layer on

both sides, that a more exact calculation has become possible.

By taking as point of reference the rotation center instead of the ball above the center of the cornea, some gains become apparent. In many cases the question most essential for the ophthalmic surgeon to decide is, whether the foreign body is situated inside or outside the eyeball. The exact size of an eye is certainly not to be estimated to an accuracy of 2 mm. and the thickness of the wall of the eye is about 1 mm. From here often arises an undesirable doubt by using Sweet's method.

Broadly speaking, by rotation of the eye a foreign body, if located inside the eye, will be displaced; and it will remain unmoved, if situated in the orbit outside the eye. Valuable information is often to be gained by this sign. By closer consideration it is to be observed, that a foreign body, stuck in the tissue adjacent to the ball, will remain not absolutely unmoved by rotation of the eye, but the displacement will be over a much smaller angle than could be expected. Calculation in such a case will lead to a very absurd localization of the rotation center of the eye in relation to the orbit.

Further the vision of an injured eye is frequently so far diminished, that fixation is abolished and latent deviations become manifest. Such an occurrence should be taken into consideration by

using both methods: but then the adjustment of the middle of the injured eye exactly below the ball is practically uncertain with Sweet's apparatus.

Again Sweet's expensive instrument

is not everywhere available.

We have the object of determining in a rectangular system of coordinates, the distances of the foreign body from the rotation center, in the sagittal, the vertical and the frontal directions.

The distances in the sagittal and vertical directions are easily found by

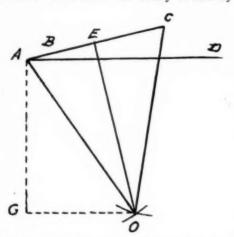


Fig. 1.—Diagram showing movement of shadow of foreign body, from A to C, on film held parallel to median plane of body.

making the X-ray exposure with the rays passing parallel to the frontal axis. If the eye be turned over a definite angle, for instance over 45°, each point of the eye will make a definite rotation; and two shadows will be found on the film. By placing an edge of the film parallel to the line of vision in the primary position of the eye, it is possible to determine the location of the horizontal line on the film, corresponding with the line of vision by looking straight forward. Now the position of the rotation center may be calculated and constructed by means of the distance between the shadows. By taking into consideration the angle between the horizontal line and the line connecting the shadows, we can find the sagittal and the horizontal ordinates concerned.

The second film for the determina-

tion of the third ordinate in the frontal direction is taken with the rays passing parallel to the sagittal axis.

The eye can not be rotated at will around the sagittal axis, so an easy localization by rotation around this axis is unattainable. Nor can a satisfactory result be obtained by rotating the eye around the vertical axis, because by this direction of the X-rays sharp photos cannot be made. It is difficult and inexact to place a sensitive film inside the mouth. Hence we have to rely upon the photo taken in the sagittal direction, and we will detect two shadows on the film, if, during half the time of exposure, the patient rotates his eye 45° to the tem-There will be a definite poral side. horizontal distance between the two points, and from this the location in the frontal direction may be calculated.

Apparently the calculation of the formulas is somewhat intricate and the representation of the movements complicated; but in practice the method will be found very simple.

Calculation of the sagittal and vertical ordinates is as follows. In diagram I we will denote the shadow of the foreign body in the first position, A; and in the second position, C. Let AD be the horizontal direction; let the eye have rotated over 45°, then the projection of the rotation center can be found by dividing AC perpendicularly into two equal parts, and by drawing from C a line which makes with AC an angle of  $67\frac{1}{2}$ °,  $\frac{1}{2}\times(180^\circ-45^\circ)$ . The intersection of this line with the perpendicular is the projection of the rotation center.

It is more practical to use measures of length only for the construction.

$$\frac{\text{AO}}{\text{AO}} = \sin \left( \frac{1}{2} \text{ of } 45^{\circ} \right); \text{ hence OA} = \frac{1}{2} \text{AC}$$

 $\frac{\frac{1}{2}AC}{\text{sine } 22\frac{1}{2}^{\circ}}$  or  $OA = 1.3 \times AC$ .

Therefore we draw an arc of the circle from C and from A with a radius = 1.3 times the length of the line AC, and the intersection is the projection of the rotation center. Both the ordinates of the point A, AG and OG can

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The figure 1.3 depends only upon the rotation angle and may be calculated with greater exactness, if desired.

One addition, however, is needed. It is essential to know which shadow corresponds with the first position of the eye, and which with the second one. For this differentiation we ask the patient to focus a point straight forward during ½ of the time of exposure, ½ while looking 10° upwards, and ½ seeing 45° upwards. The two adjacent points indicate which point corresponds with the first position; the distance between the two outmost points being the distance by rotation over 45°.

Now we may conclude from the direction of the rotation of the eye, that, the second point being situated lower than the first, the foreign body must be situated in one of the two posterior quadrants; being located further backwards, in the upper quadrants. These data gained by this device may be needed to make sure, whether the perpendicular line EO (in diagram 1) must be drawn upwards or downwards AC. It would be preferable, however, to avoid this expedient, owing to the consideration of the diminished sharpness of the shadow, if the exposure be made in three different positions.

The second film, for the determination of the third ordinate in the frontal direction is taken with the patient lying down with his face prone on the film and the tube placed above his occiput. The film is covered with a reflecting screen. In the first position the patient is asked to look straight forward and in the second to direct his eye to the image of an electric torch, held 45° to the temporal side. In this way two shadows will be produced on the film with a horizontal distance, which may be measured directly.

Here calculation is somewhat more intricate, but in practice it is simple.

In diagram 2 let O be the spot, where the vertical axis, passing thru

the rotation center of the eye, cuts the horizontal plane perpendicularly. We denote A as the spot of the foreign body before, and B after the rotation over  $45^{\circ}$  over angle AOB. We posit OD = a (known from film 1 as the sagittal ordinate). We posit CA = b (known as the distance between both the shadows on film 2); then we wish to know AD, which we call = d (the third ordinate of the foreign body in the frontal direction).

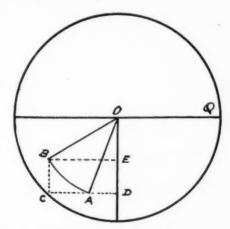


Fig. 2.—Diagram showing movement of shadow, from A to B, in plane perpendicular to visual axis in primary position.

We posit angle AOD = angle x. Hence from figure 2  $\frac{OD}{OA}$  = cosine x; so  $OA = \frac{a}{\cos ine x}$  (1)  $\frac{AD}{OD}$  = tangent x; so d = a tangent x  $\frac{BE}{OB} = b + d$ ; so BE = b + a tangent x  $\frac{BE}{OB} = \sin (45^{\circ} + x^{\circ})$ ;

therefore  $OB = \frac{b + a \tan ent x}{\sin (45^{\circ} + x^{\circ})}$  (2)

Hence by equation (1) and (2)  $\frac{a}{\cos ine x} = \frac{b + a \tan ent x}{\sin (45^{\circ} + x^{\circ})}$ 

cosine 
$$x$$
 sine  $(45^{\circ} + x^{\circ})$   
 $b + a$  tangent  $x$   
sine  $45^{\circ}$  cos.  $x + \cos$ .  $45^{\circ}$  sine  $x$ 

$$0.7 \cos x + 0.7 \sin x$$
  
developed:  $0.7 a (\cos x + \sin x) - b \cos x + a \cos x$ , tangent x. or  $07 a$ 

$$(1 + \text{tangent } x) = b + a \text{ tangent } x$$
, or tangent  $x$   $(a - 0.7a) = 0.7a - b$   
Hence tangent  $x = 7/3 - \frac{10 \text{ b}}{3 \text{ a}}$ 

$$\frac{AD}{AD} = \tan x$$
, so  $AD = d = a \tan x$ 

Hence 
$$d = 2$$
 and  $1/3 a - 3$  and  $1/3 b$ 

From some examples the exactness of the formula may be demonstrated:

We posit b = 0, then tangent x = 2 and  $\frac{1}{3}$ . Hence angle  $x = 67^{\circ}$  (with more exact calculations = 67 and  $1/2^{\circ}$ ). The correctness of this result may be read off from the diagram. If we make

$$\frac{d}{b} = 0$$
,  $\frac{7}{3} = a = \frac{10}{3} = \frac{b}{a} = \frac{7}{10}$   
= sine BOA. Hence sine BOA =  $\frac{7}{10}$ 

and from the goniometric table BOA=45°. This result also is correct.

A few remarks may not be superfluous. It should be borne in mind that the X-photo is not a projection, but a concentric skiagram. For instance, if the distance of the rotation center from the film be one inch, and this distance from the center of the Coolidge tube twenty inches, all the calculated figures must be reduced over 1/21 because the skiagram is over 1/20 enlarged.

Then we have assumed, that point A, situated more to the right, corresponds with the first position. Usually this is the case, but if CD be situated so near to OQ, that QOA may become smaller than ½ 45° then it may happen, that the second point B is situated to the right of A. In such case the expedient, applied to film will be efficient. If during a part of the time of exposure in the first position patient looks upwards over 10°, then a shadow is produced a little above or below the first shadow, by which means it can be discerned from the second point B, which must be situated always horizontally in relation to A. Also here it would be advisable to avoid the expedient, the necessity of which is hardly felt. As regards the algebraic sign of the different values, we must remember that in both eyes the cornea is assumed to rotate to the temporal side. In the system of ordinates the algebraic sign of a is to be taken positive if situated in front of the rotation center; b is to be taken positive, if the shadow corresponding with the first position be situated nasal in relation to the second shadow.

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### LOCALIZATION IN PRACTICE

The patient is laid with the cheek on the table, on which the film is placed, and is asked to look straight forward. The film is so placed that one of the edges is parallel to this direction, where at the distance of 1 M. a letterboard is held. The patient is told to focus the first letter of the lowest line for three seconds, for the three following the last letter of that line, and during the next three a point, situated 1 M. farther to the headside than the first letter.

The second photo is now taken with the patient prone on the film. He is told to look during the first three seconds straight forward and for the next three to an electric torch held 1 M. behind the eye and 1.05 M. more to the temporal side. He is able to discern this light plainly in the reflecting screen covering the film.

Now we find on film 1 three points and we draw the line, which connects the two outermost points, and, thru the first point the horizontal line. From each end of the line is drawn an arc of the circle with  $1.3 \times$  the length of the line as radius. The intersection of these arcs is the projection of the rotation center of the eye and both the ordinates in the sagittal plane may be drawn and calculated. We call the ordinate in the sagittal direction = a. On the second film the distance between both the shadows is measured and called = b. The third ordinate in the frontal axis =d, we fined by:  $d=2\frac{1}{3} a=3\frac{1}{3} b$ .

My chief object in putting forward this method is to induce others to give it a trial, and so to determine its value; in a few cases it has proved very useful to me.

### CYCLODIALYSIS THE BEST OPERATION FOR SIMPLE GLAUCOMA.

RICHARD CORDS, M.D.

COLOGNE, GERMANY.

The early papers on this operation failed to do justice to its value. In later years better statistics have been published. The writer believes it the best operation for simple glaucoma, because it is easy, free from danger, with very few complications and produces a very satisfactory influence on the tension and the visual field. In most cases, one operation suffices, but it may be repeated and necessary operations may be done on the same eye subsequently. These views are supported by citations from the literature and from the writer's own experiences. Read before the Cologne Association of Ophthalmologists.

The discussion about the circulation of the ocular fluids is as lively as ever. The dispute about the Leber theory is not yet decided. At the same time, the treatment of glaucoma is based on experience; and theoretic discussion about the effect of an operation is unprofit-

This applies especially to the most modern operation against glaucoma, cyclodialysis. We do not know, if the reopening of Fontana's channels of exit is the cause of its results; or, what is less probable, an atrophy of the ciliary

body (Krauss, Salus).

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In fact there can be no doubt about the very satisfactory results of this operation in many cases of glaucoma, and I will show in this paper, that it is the best, even tho not quite a sure method against glaucoma. I base this judgement on my experiences at the University Clinics in Leipzig, Bonn and Cologne, with iridectomy, sclerectomy (Lagrange) and trephining and from the modern literature. I will try to give a short comparison of

these proceedings.

Cyclodialysis was described by Heine as early as 1905. At the thirtythird meeting of the Deutsche Ophthalmologische Gesellschaft in Heidelberg, his speech made a deep impression; but unfortunately the operation did not spread at that time, because the proceedings establishing a fistula prevailed. Moreover, the first papers about the results of this operation were not very encouraging and critical voices doubted its worth (Krauss). The experiments on animals by Wichodzew, Wernicke, Judin and Krauss did not bear out Heine's theory and gave no anatomic explanation about the effect of the procedure.

Later, we find better statistics; I mention the papers of Heine, 1906, Boldt, 1908, Meller, 1908, Elschnig,

1909, Windrath, 1911, Meissner and Sattler 1912 and Schuerhoff (Heine's clinic) 1919. In the United States, the operation was recommended Knapp, 1909, Zentmayer, 1910 and Gradle, 1910. From 1920, the appreciation of the cyclodialysis became greater, thanks to the long and important paper of Salus from the Elschnig clinic. In the same year appeared the warm commendation of the operation by Gradle.

It is not necessary to give here a description of the operation; we find it in Gradle's paper in this Journal, 1920. Only a few words are needed about my own procedure. I, too, do not use the keratome for cutting the sclera as Heine does, but a Graefe knife. I make the incision 5-7 mm. from the limbus and cut vertically on the fibers of the sclerotic. Working carefully, it is almost impossible to perforate the choroid; the operator feels the gnashing of the blade on the tense fibers and cutting one by one, he may finish with them without touching the underlying membrane. For separating the ciliary body from the sclerotic, I prefer the stylet of Elsching, which must be pressed against the sclerotic. In every case of uncomplicated simple glau-coma, I turn it a little, so that the aqueous humor may pour out; and I never have seen any inconveniences from this procedure. With Salus and Gradle, I find it very important, that the spatula be turned to the right and the left, so that the ciliary body is loosened as far as possible; and at least one-third of the angle of the anterior chamber is made free. The next days, after the operation, I perform a slight and careful massage of the eye, by pressing it with my two fore-fingers for one or two minutes, especially if the tension is not so low as I wish. succeeded nearly always in lowering it 3-5 mm. Hg or more. Headaches disappeared sometimes some minutes af-

ter this treatment.

Surely there are many cases of compensated glaucoma, which do not require an operation and in which it is possible to keep the tension low and the visual field undisturbed by the use Naturally, we must be of miotics. sure that the patient follows our advice and uses his drops very carefully. In all the other cases, with a constant or periodical increase of tension, or if the patient does not seem to be care-Until 1919, I always ful, I operate. performed the Elliot trephining. Now this operation is for me, as for Heine, only an ultimate refuge in those cases, in which repeated cyclodialysis did not give the desired result.

I put together the reasons why I think cyclodialysis the best operative procedure in simple glaucoma. 1. The operation is easy and without danger. 2. The complications after the operation are very few. 3. The influence on the tension and the vision is very satisfactory. 4. In a great percentage of the cases, one operation suffices; in other cases, it may easily be repeated. 5. In refractory cases, any other opera-

tion may be made afterwards.

1. Working carefully, cyclodialysis is one of the easiest bulbar operations. The possible complications are very few. If the bleeding from the subconjunctival or scleral vessels is stopped carefully and the fibers of the sclera are cut one by one, a prolapse of the vitreous is impossible. If it happens, it has an effect like a posterior sclerotomy and the operation must be stopped; it may be repeated some days later in another meridian. Bleeding into the anterior chamber, which happens very often and may fill the whole chamber, is also without importance; it is reabsorbed in most cases in a few days. The iris should be avoided; but if it happens to come on the stylet and an iridodialysis is performed, this does not disturb the effect. Hurting the lens is almost impossible.

2. The possible complications after the operation are also very few. Until now no case of glaucoma malignum, high tension immediately after the operation, is known. This complica-

tion is one of the worst experiences after iridectomy (after Elschnig in 2%), causing sometimes a complete and irreparable blindness in eyes with good vision. The common rule of the "nil nocere" cannot be violated in a sadder way. The cause of glaucoma malignum is not yet quite clear; surely there must be an unfortunate predisposition for it. The common opinion is that the lens is incarcerated in the wound and checks the circulation of the ocular fluids. If this is the case, glaucoma malignum is an impossible complication of the cyclodialysis; on the contrary, Heine saw a very good influence of his operation in two cases, in which the anterior chamber did not come back after iridectomy. Therefore, no objection can be made against the emptying of the anterior chamber during the operation. In all cases I saw a quick restitution of the chamber, altho it remains often very shallow.

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Infection is almost impossible, if the conjunctiva does not contain cocci and the instruments are sterilized carefully. In the literature I only find a few cases of iridocyclitis after the operation, as in the paper of Meissner and Sattler. We see this complication still less than after iridectomy, not to speak of trephining, after which late infection hangs like Damocles' sword over the fate of the operated eye. All operators have this sad experience, I saw it three times; and also the new modifications of the Elliot operation do not give complete security against it. For that reason, trephining is for me, as I indicated before, only an ultimate refuge, and many enthusiastic admirers returned to iridectomy. A slight postoperative iritis with some posterior synechiae is rather common. It happened in 5.4% of Salus' cases. Mydriatics should be instilled in these cases.

After sclerectomy we sometimes observe that the intraocular tension remains too low, 3-8 mm. Hg. I never saw such an hypotension after cyclodialysis; altho the Schiötz tonometer showed sometimes a long time 8-15 mm. However, Salus mentions 6 of 200 cases, in which low tension had a bad influence on vision.

Lenticular opacities and cataract

seem to appear rather often after the operation; but often remain stationary. Statistical investigations are necessary to show that this disagreeable complication is seen oftener than after iridectomy.

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In 10% of the cases (Salus) the operated eye becomes myopic. Salus sees the probable cause of such an alteration of the refraction in a lessening of the tension of the zonula fibers.

Performing the operation as described before, a bleeding into the anterior chamber is almost the rule. We are sometimes successful in stopping it after emptying the chamber by pressing the eyeball. Generally this complication is without any importance. In the literature I find only one case of expulsive bleeding, in a man of 77 years, by von Grosz. Surely this bad result would have happened after any other operation normalizing the tension. If the hemorrhage fills the whole chamber, the tension may remain high for some days and a puncture of the cornea is advisable. Hemorrhages into the vitreous are very rare, those into the retina nearly as often as after iridectomy.

The only complication after Heine's operation which deserves more words, is the increasing of the tension some time after the operation. Generally the tension is very low after the operation, if the anterior chamber is emptied, then it increases and reaches occasionally almost the same or a higher degree than before. Even glaucoma attacks have been described in rare cases (Pick, Yoshida); in these only iridectomy could save the eyes. Transitory high tension is observed by Heine in 10%, by Ishikawa in 7.5%, and by Elschnig only in 1%. In three of my cases the tension was 28-32 the day after the operation, but went down the next day and remained low. Generally the tension begins to decrease the second or third day after the operation (Heine); in rare cases this happens only after 8-10 days (Salus).

The influence on the tension is sometimes transitory and a late increasing is observed, after some weeks or months. This event is very common after iridectomy (in 25%, Elsching). The

lasting good results after this operation vary between 15 and 71% in the papers of different operators (Wygodski). In comparison with this I find in the statistics of cyclodialysis cited below 58% lasting, good results in cases observed more than six months.

3. Therefore, we can say that the influence on the tension is on the whole very satisfactory. I will try to give some statistical numbers, altho I know that a comparison of the results of different authors is not free from objections. Even the definition of simple glaucoma or glaucoma compensatum is a different one with different authors.

We must distinguish the results of the early time, when the operation was performed after the rules of Heine's first publications. His procedure was not sufficient, because he opened only 2-3 mm. of the Fontana channels and avoided a larger dialysis of the ciliary body. In this period the results of the operation were not encouraging; in many cases the tension increased after a short time. Moreover, the operation was tried in all kinds of glaucoma, also in inflammatory and acute forms. Thus it happened that Czermak, Siegrist, Pagenstecher, Goldzieher, Schmidt-Rimpler, Weekers and others only doubtful results. In the following period, better indications were given. So Meller commended it in advanced cases with high tension, absolute glaucoma, where iridectomy is difficult and .. dangerous, hemorrhagic glaucoma and in those cases, in which one eye grew blind from glaucoma malignum. thoff and Endelmann made the operation only in simple glaucoma, glaucoma absolutum and hydrophthalmus, Knapp only in advanced cases of chronic glaucoma.

We are now in a third period, in which the operation is made after the new rules of Elschnig, Salus, Gradle and Heine, and the ciliary body is dialyzed as far as possible. The operation is limited to chronic cases without inflammation. In simple glaucoma it is especially commended by Uhthoff, Meissner and Sattler, Gradle, Elschnig and his disciple Waldstein, Salus, Beselin, Cremer and others. Cremer

says that in certain cases, cyclodialysis is the only method, by which we can avoid certain blindness.

If I put together the results of some papers, including my own experiences, concerning glaucoma simplex, I find the following statistics:

From 279 operated cases, a good result lasting more than six months was observed in 96. In 56 cases the lowering of the tension lasted only a short time; 116 cases showed a good result, but could not be observed long enough. Bad results in 11 cases.

By all observers the influence of the operation on the vision and the visual field is praised. Already in 1909, Ohm operated upon some cases, in which the scotoma reached almost the fixation point; neither he nor other operators observed that it became larger after the operation. Also Salus declares that small visual fields are influenced very well. However, Beselin as well as Salus, describe some cases, in which the visual acuity decreased some time after the operation, in spite of good tension.

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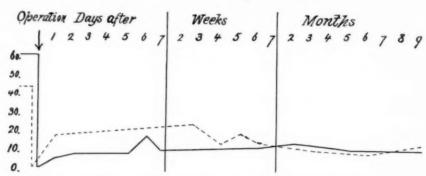


Fig. 1.—Effect of cyclodialysis in two cases. Figures on left indicate tension of eyeball in mm. Hg. Arrow shows time of operation. Figures at the top indicate time elapsing after operation; at first days, then weeks, last months.

|                | Good               | bserved |                  |                |
|----------------|--------------------|---------|------------------|----------------|
| Author Year    | 6 month<br>or more |         | Brief<br>benefit | Bad<br>results |
| Wernicke .1908 | 1                  | 4       | 3                | 1              |
| Boldt 1907     | 4                  |         | 1                |                |
| Ohm1909        | 2                  |         |                  |                |
| Elschnig1910   | 4                  | 8       | 2                | 3              |
| Meissner       |                    |         |                  |                |
| Sattler 1912   | 6                  | 2       | 2                | 1              |
| Cremer1920     | 10                 |         | 2                |                |
| Salus1920      | 60                 | 97      | 37               | 6              |
| Cords1923      | 9                  | 5       | 19               |                |
|                | _                  |         | _                |                |
|                | 96                 | 116     | 66               | 11             |

Naturally it is very difficult and not free from objections to compare the results of different authors, who judge their cases from different points of view. How to register, for example, the cases in which the tension was normalized, but the central vision or the visual field became worse? Thus under the 37 cases of Salus with transitory result are six of this kind. Gradle gives for all cases of cyclodialysis (different kinds of glaucoma), the following numbers: good result 50%, transitory 20%, no result 30%.

Two examples may show how the tension changes after the operation.

Case 1: Man of 63, lost the right eye six years ago by glaucoma absolutum. Since two years, premonitory symptoms in the left eye. Tension kept normal by eserin. When the patient came back 1923, March 9, the optic nerve was excavated; V=5/7, circular scotoma. Tension in spite of eserin, 42 mm. Hg. March 11, cyclodialysis in the upper temporal meridian. The anterior chamber is emptied. Small hemorrhage. T=-3. March 31, T=15. April 9, T=20. April 11, T=23. April 17, T=15. Sept. 4, T=10. Sept. 8, T=11. Sept. 12, T=14, always without miotics. V=5/7, scotoma unchanged.

Case 2. Man of 62. Lost the sight of his left eye by a fracture of the skull and consequent atrophy of the optic nerve. Premonitory symptoms since August, 1920. Used from that time miotics. When I saw him at first, Dec. 1, 1920, there was maximal miosis, a deep excavation, V = 3/15.

of the Visual field undistured, T=45 mm. Hg. Dec. 10, cyclodialysis. Only little visual Ohm, loss of aqueous humor. Small hemorwhich In the afternoon some heade fixa-Dec. 11, blood disappeared. oper-Jan. 7, 1921, T = 30. T = 27 mm. larger Eserin-pilocarpin ordered. Jan. 24, us de T = 29. March 1, T = 34. March 20, are in-March 29, T = 37. Oct. 3, Dec. 19, T = 28. Feb. 28, eselin cases. 1922, after a contusion of the eye, T = reased 50 mm., the next day T only 25. During 1 Spite this year the tension was kept about 30, by the constant use of eserin 6 to 8 times a day. At last when the tension increased on one day to 61, the patient found the courage to endure a

> second operation. Chamber Oct. 17, cyclodialysis. emptied. T = -2. Oct. 23, T = 8. Oct. 25, T = 20, after massage 13. Oct. 28, T = 12. Nov. 10, T = 15. Dec. 14, T = 16. Jan. 12, 1923, T = 17. May 17, T = 17. Sept. 20, T = 15. V. with -2 D. 5/7, visual field normal.

> Two of my diagrams may show how the tension changes in successful cases. 4. The operation may easily be re-

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peated, if the result is not sufficient. In this way all Fontana channels may be opened, by and by. It is also very easy

to perform the operation a second time at the same spot, by reopening the scleral cut. We see rather often, that a lasting result is attained only after the second operation. I performed cyclodialysis in glaucoma simplex 23 times; I had to repeat it in four eyes and made it three times in one eye. In this case, a young man, the tension was also by the third operation only normalized for some days, and finally I gave the advice to trephine.

5. Any other operation may be made afterwards. In refractory cases an iridectomy or a sclerectomy can be made a short time after the cyclodialysis. In the rare unfortunate cases, in which a great increasing of the tension, or a glaucoma attack takes place after the operation, the eyes can be saved by another operation. This is necessary, too, in those cases, in which the tension cannot be normalized by two or three cyclodialyses. I had to employ the trephine in two cases.

In any way the dangers of cyclodialysis are so few and the results are so encouraging in glaucoma simplex, that in my opinion the operative treatment should always be commenced with this operation.

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# FURTHER EXPERIENCE WITH PERIPHERAL IRIDOTOMY (CUR. RAN) AND SUBCONJUNCTIVAL LIMBUS PUNCTURE IN THE TREATMENT OF GLAUCOMA.

H. GIFFORD, M.D., F.A.C.S.

OMAHA, NEBRASKA.

More extended experience places a somewhat more restricted value upon this operation. In many cases, its beneficial influence is slight, or temporary. Puncture thru the limbus, which may be repeated several times, gives some of the same benefit. The value of these procedures, for reducing tension prior to a more radical operation and for glaucoma from temporary swelling of the lens, is pointed out. Read before the Colorado Congress of Ophthalmology, July 30, 1923.

In the American Journal of Oph-THALMOLOGY, Dec., 1921, I reported the results obtained in some 30 cases of chronic glaucoma by a small peripheral iridotomy according to the method recommended by Curran of Kansas City (Archives of Ophthalmology, 1920, p. 131) and summed up my impression of the operation, in part, as follows:-"If the favorable results of the operation prove to be permanent, peripheral iridotomy, or some modification acting on the same principle, is destined to displace ordinary iridectomy and the fistulizing operations from a large part of the fields which they now

large part of the fields which they now occupy."

I regret to report that further observation of these cases and of about

fifty more in which the operation has been done since then, has convinced me that the operation will have by no means so large a field as I was led to expect by my first two years experience with it. In a few cases the tension has remained at about 25, but in the great majority it has gone higher. Where the preoperation tension was not over 35 or 40 (Schiötz), it has generally returned nearly to the same height; but where the preoperation tension was 60 or more, it has gentension was 60 or more, it has gen-

tension was 60 or more, it has generally returned in the course of a year or two, only to 35 to 40. Case 1 is of this sort.

S. W., aet. 52. V=RE. 20/100, LE. 20/30-2. Tension, RE. 63, LE. 72. Right field badly contracted. After Curran each eye, tension, RE. 17, LE. 27. Three months later, tension, RE. 20, LE. 20. Eighteen months later, tension, RE. 40, LE. 35. Vision and fields about the same as at first. The patient is so well satisfied that he can not be persuaded to take a couple of

days off for a limbus puncture. This and a number of similar cases tend to confirm Curran's contention that after having stood a tension of 50 or more, with comparatively little damage, many eyes bear with equanimity a tension around 30 for a long time.

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In several cases in which the tension was going steadily higher after the Curran, a second iridotomy or merely a limbus puncture has been done, followed by daily massage and eserin, with the maintenance of tension from 25-30, and no change in vision or fields. The repetition of the operation. however, has generally produced only a slight effect, so that while in about 30%, the tension has remained for some months below 35, with little or no deterioration in the fields, the responsibility of having the patients examined often enough to be sure that they were not slipping has been so great; and the impossibility of keeping suficiently close watch on the patients of this sort who live at a distance has become so apparent that I am convinced that, in a great majority of cases, it is better to do something else, with a greater and more permanent effect upon the tension.

Nevertheless, aside from the cases in which an apparently good result has been obtained, peripheral iris puncture, or some equally simple and less dangerous procedure with a similar effect has, I am convinced, a definite place in the therapeutics of glaucoma. Its most important function will be, I believe, as a preliminary to the more radical operations, especially in cases where, with relatively good central vision, the contraction of the field, on at least one side, comes very

close to the center.

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Probably no one who has operated on more than a very few cases of this kind, by iridectomy or one of the fistulizing methods, has escaped the unfortunate experience of finding that the sight of the patient which, before the operation, was nearly normal, has dropped immediately after it to something like 20/70 or worse, with little or no subsequent improvement. This experience has been so general that some good operators advise total abstention from all operative interference in such eyes. My own belief, however, is that where the sight or the field is steadily decreasing, even very slowly, in spite of myotics and all other available nonoperative sorts of treatment, the patient should be advised of the risk involved, but should be assured that the chance of retaining some useful sight is decidedly better with an operation than without, even if there is some immediate loss.

Just what it is that causes this sudden drop in the vision after a radical operation, has not, so far as I know, The explanation been ascertained. that comes most readily to mind is the supposition that it is due to small hemorrhages. That such hemorrhages may be the result of a sudden drop from a high to a low tension, is well recognized. The writer has seen one patient in whom merely the vigorous use of a myotic produced serious, damaging hemorrhage in the central retina of both eyes in a case of homatropin glaucoma. But in the majority of cases where the vision drops after an operation for chronic glaucoma, no hemorrhages can be seen; leaving, as the most probable explanation, the theory that as a result of the sudden decrease of pressure, the relative edema which occurs does harm, either to the nerve fibers or, more probably, to the retinal elements.

In about twelve eyes of this kind I have done a peripheral iridotomy, or a limbus puncture, which reduced the tension to somewhere between 12 and 20. In several of these eyes the tension has, so far, not risen to more than 24 and nothing more has been done; but in five of them the tension having

risen to 25 or more, an Elliot trephining or an iridotasis has been done, thus keeping the tension at 20 or less without appreciable loss of sight or field. Case 2, is a typical result of this kind.

The patient, G.B., aet. 61, had been losing sight for some years. V=RE. 20/50, LE. 20/70. Tension, RE. 32, LE. 32. Deep sharp excavation each disc, fields very much contracted. A Curran was done on each eye; reducing tension to, RE. 10, LE. 15. After six weeks, tension, RE. 24, LE. 22. Trephining was then done on each eye, leaving tension about one year later, RE. 15, LE. 10. Sight =RE. 20/50, LE. 20/40. Fields slightly larger than when first seen.

I do not claim that this preliminary decompression is a sure preventive of the decrease in sight which follows a more permanent operation. I have had one case where, in spite of it, the vision, after an iridotasis, has dropped from 20/40 to 20/70. Most of this loss, however, was later recovered.

It should be borne in mind also that in a certain proportion of cases, which I should estimate at about 10%, the peripheral iridotomy, plus massage and eserin, will keep down the tension for at least a year or two and perhaps indefinitely; so that even if we do not use it, or something sirilar, as a routine measure; it may well be tried upon the chance of its doing permanent, or long continued temporary good, in cases where the patient has only one efficient eye; or where the patient wants to have every chance of pulling thru without resorting

#### DANGERS OF THE OPERATION.

to anything more serious.

A much more serious question and one which I regret to raise but feel obliged to, is whether or not, the risk attending a peripheral iridotomy is so great, in proportion to the good which it does, as to make its general use undesirable.

In my first report, I stated that while the description of the operation made it seem exceedingly simple and harmless, as a matter of fact, it was

by no means easy to get the desired result in all cases. In two cases out of thirty it did positive harm. In the fifty odd peripheral iridotomies which I have done since then, I have had two other disastrous cases. In the two cases which I reported in my first paper, the harm came from hemorrhage resulting from difficulty in making the counter puncture in the iris. In the effort to make the second puncture I carried the knife-needle so far across the periphery of the posterior chamber that some large vessel was pricked and a severe hemorrhage into the chamber occured, followed by some increase of tension, with a good deal of reaction and, finally, a decidedly poor result. Curran also has had experiences of this sort. We both reached the conclusion that unless the counter puncture could be promptly and easily it was unwise to try to do more than make a single puncture of the iris root, possibly with the addition of cutting a few fibers when withdrawing crosswise needle.

Armed with experience and this decision, I started in again doing peripheral iridotomies with a feeling that there was no further danger of my doing harm. In this I was mistaken. In a patient with vision a little less than 20/30, each eye with a tension be-tween 30 and 35, which eserin failed to reduce, I started to do a peripheral iridotomy in the left eye and after making a puncture and counter puncture, was pressing the iris tissue against the cornea with the blade of the knife-needle when, in spite of good anesthesia up to that point, the patient gave a sudden jerk which caused me to withdraw the needle quickly and to my horror I dragged out with it fully three-fifths of the iris. profuse hemorrhage into the chamber was followed by increase of tension with a long drawn out reaction, complicated by slight infection of a paracentesis wound, and the formation of cataract; the result after one year being tension of 20, with a somewhat poor projection, which makes the prospect of a successful cataract removal doubtful.

It would not seem possible to do so much damage to an iris by quickly withdrawing a sharp knife needle while it was pressing a few fibers of the iris against the inside of the cornea; it nevertheless did so, and for a time I thought that my peripheral iridotomy days were over. Maturer reflection, however, convinced me that a similar accident could certainly be avoided in the future, if I made either a simple or a double puncture in the iris root without attempting to cut the iris fibers crossways by pressing the blade against the cornea. So altho my faith in the permanence of the results was on the wane, I continued to do peripheral iridotomies up to June 10th, 1923. Then, in the case of a woman, aged 67, with chronic glaucoma, tension RE. 60, LE. 55 with vision, RE. 20/70, LE. L. P., I did a simple peripheral iris puncture in the better eye. This caused quite a little hemorrhage into the chamber but nothing at all excessive; so that I felt no anxiety until the next day, when I found that the patient had been having quite a little pain thru the night and that the blood in the chamber had increased somewhat instead of diminishing, and that the tension had decreased little if at all. In spite of a paracentesis (which let out very little of the blood), the free use of salicylat and massive doses of magnesium sulphat, the tension remained high and the eye painful. On the fifth day, the tension still being 45, I did an iridotasis which reduced the pain and tension, but quite a little reaction continued, and when the patient left the city about three weeks later, altho the vision in the operated eye was slowly improving, it had only reached about 6/200; the tension by the finger test being approximately normal.

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These unfortunate results, tho rare, make it clear that the operation is not to be classed with the practically harmless ones; and emphasize the importance of always having a perfectly sharp needle-point, and the danger of persisting in the attempt to puncture the iris when it continues to recede before the needle. They have

also tended to make me substitute for the peripheral iridotomy, where it is done purely as a preliminary operation, a subconjunctival limbus puncture, followed by eserin and massage. RESULTS OF LIMBUS PUNCTURE.

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To this I am the more reconciled since I find that much of the good result of the peripheral iridotomy can be produced by one or more subconjunctival paracenteses with a knife-needle, followed by massage and eserin. was led to this conclusion by observing that in two of my cases, a very diffuse subconjunctival edema has persisted for a year or more, both after a clean cut Curran operation, and, notably, in one case with fair central vision and very narrow fields, in which the knife-needle made a mere pin prick in the iris tissue, so small that it could not be seen after a week or two. The tension in this latter case, has remained, under eserin and massage, for nearly a year, below 25 in both eyes-(37 and 40 before the operation); with vision and fields slightly improved.

This ideal result evidently depends upon some individual peculiarity in the healing process of the limbus, since where it has occurred in one eye, it has always occurred in the other also, if the latter were operated on in the same way. The occurrence of such a fortunate result after a simple double puncture probably was the basis of such slender share of approval as de Wecker's anterior sclerotomy received some thirty-five years ago. do not believe that the effect of Curran's iridotomy generally is due to the paracentesis; but I am convinced that in a small proportion of cases the permanence of the result depends upon the production of a subconjunctival fistula; while in quite a fair proportion, as good a result can be obtained by a puncture, as by a puncture plus the iridotomy, if it be followed by the use of eserin together with regular massage of the eyeball for several seconds, three times a day, kept up indefinitely.

It should be distinctly understood, however, that I have been trying the

subconjunctival limbus puncture for a few months only and that it is too early to assign it a definite place. Possibly the massage is the essential factor in most of these cases. I can simply say that it does at least temporary good in some cases, and that on account of its practical harmlessness and its repeatability it is worth a trial, as a preliminary to something more radical.

#### TECHNIC OF THE PUNCTURE.

I use eserin, one grain to the ounce, and a little holocain every two minutes for ten minutes, before making a small subconjunctival injection of 1% cocain near the point of entry; and another over the internal rectus tendon, which is used for fixation. The needle is started at least 5 mm. away from the cornea, and is carried forward under the conjunctiva so as to enter the chamber as near as possible to the clear cornea. It is carried clear across the upper part of the chamber. Then most of the aqueous is allowed to escape, not only from the chamber but from the subconjunctival bleb which tends to form. I make this latter point, because I have found that where a large aqueous bleb forms and is allowed to absorb slowly, the conjunctiva becomes closely adherent to the sclera over most of the area involved.

Rather vigorous massage for about fifteen seconds, is made the same evening and three times a day thereafter. No more eserin is given for two days unless the pupil is wide from cocain; but from that time on it is used three to four times a day (1/2 to 1 grain to the fluid ounce). Sixty grains of salicylat are given the same evening and for the next two or three days. does not usually bring the tension as low as a Curran operation; but it generally brings it to about 20, when it has not been much more than 40, and keeps it thereabout for from two weeks to several months. Whether any cases, in which an obvious fistula has not been formed, will retain a low tension permanently, either from this procedure or from a Curran operation, time alone can tell. I have the impression that where no iridotomy is made an extra large Knapp knifeneedle gives better results than a puncture with a narrow knife, possibly because, with it, some of the fibers are pushed apart instead of being merely cut, or because some of the endothelium of the chamber is drawn out into the wound by the needle.

Where the tension fails to go low enough after a single puncture, I should repeat it at least once, if the condition of the field is critical, before doing the fistulizing operation or the Curran. Or where after staying down for a time, it keeps coming up, there can be no objection to repeating the puncture several times if the state of mind or health of the patient makes a longer postponement of a radical operation desirable.

### CURRAN'S OPERATION IN GLAUCOMA FROM SWOLLEN LENS.

Another positive indication for the use of peripheral iridotomy is afforded by the somewhat rare cases of glaucoma from the rapid swelling of an unripe cataract. The writer has seen two of these cases, in which the Curran operation proved to be a most valuable aid in an embarrassing situation. In each case the patient was a woman, in the forties, who came to me with a tension of about 50 and 60 respectively, associated with a good deal of pain, congestion, and a very shallow chamber. In each case, after using eserin freely, I passed a fine ground-down cataract knife about 11/2 mm. wide, subconjunctivally, thru the limbus, then thru the root of the iris (double puncture) and out thru the limbus of the opposite side. I then cut thru the bridge of the iris tissue, in one case without completing the limbus incision, while in the other, the incision was completed. In both cases the relief of pain was immediate and the tension returned to normal and remained so. In the first case the cataract was, after a few weeks, removed with a good result; while in the more recent case, as the cataract was quite incomplete and the other

eye has normal sight, nothing further has been done.

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#### TECHNIC OF IRIDOTOMY.

In my first paper, in view of the difficulty, in many cases, of carrying out the apparently simple Curran iridotomy, I raised the question as to whether something less simple might not be safer and more certain. As a matter of fact I have found that the best way to do a peripheral iridotomy is to use the technic indicated in the above paragraph. The knife (about 11/2 mm. wide) should be 100% sharp but not limber. Pass this in subjunctivally. puncture and counter puncture the iris root; pass out beneath the conjunctiva of the opposite side, allowing the bleb to form there; cut up to complete the section of the iris root, making a complete subconjunctival section if necessary.

To prepare for this, use eserin and holocain for ten to fifteen minutes before making a 1% cocain bleb above the cornea, then wait 5 minutes before operating. Let out the aqueous from the bleb at the finish, to avoid adhesions with the sclera in case a trephining should be necessary later. Or perhaps better yet, always do the operation below, because any iridotomy, if a subsequent trephining is done, interferes somewhat with the warning dilation of the pupil when the trephine penetrates, and this interference is probably less, as is the slight danger of injuring the lens, if the iridotomy has been done at the opposite side of the chamber.

### CONCLUSIONS.

1. Continued experience with peripheral iridotemy has convinced the writer that while, by introducing it, Curran has made an important contribution to the therapeutics of chronic glaucoma, its chief value, in the majority of cases, is as a preliminary to, or to stave off some fistulizing operation. Where, after it, or something similar, the tension rises again, something more radical should be done when it reaches about 25, unless the patient can be kept under

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or ses ald anier close observation. This applies especially to cases with fair central sight but with badly contracted fields.

2. In some cases, part or all of the result of the operation is due to the formation of a subconjunctival fistula. In rare cases, such a fistula seems to be permanent and to produce a permanent normalizing of the tension. In quite a number of cases where eserin has failed to relieve the tension, the latter can be kept in the neighborhood of 20 to 25 for from one to several months, by a subconjunctival knife-needle puncture, followed by the use of eserin with rather vigorous massage of the eveball three times a day.

3. The rare but continued occurrence of bad results from peripheral iridotomy inclines the writer to substitute for it, as a preliminary operation,

a subconjunctival limbus puncture; followed by massage and eserin.

4. As an emergency measure, in cases of glaucoma from swelling of the lens, peripheral iridotomy, done preferably with a narrow cataract knife, is of great value.

Since the above was written I have seen Elschnig's article on the Curran operation (Klin. Monatsbl. f. Augenheilk. May-June, 1923, p. 667). His conclusions are: that the peripheral iridotomy does good, temporarily at least, in many cases, and is worth trying, especially with acute increase of pressure and obliteration of the chamber; and as a preliminary, in advanced chronic cases where the field limit comes close to the center at any point. He also emphasizes the difficulty or impossibility of doing the complete iridotomy in many cases.

### PATHOGENESIS OF INTRINSIC OCULAR PARALYSIS DURING CON-VALESCENCE FROM ACUTE INFECTIOUS DISEASES.

Dr. J. DE J. GONZALEZ.

LEON, MEXICO

These palsies appearing during convalescence from diphtheria, influenza, and other acute infections have never been adequately explain d. The ciliary ganglion controls contraction of the pupil and accommodation. Various poisons are known to have a selective action, sometimes on very limited parts of the neuromuscular system. During convalescence, such substances may be present in the blood and paralyze the neuromuscular synapses in a way to cause rapid fatigue without paralysis. This h pothetic substance is not specific, but may be due to reaction of the body cells against either of several toxins. Read before the Section on Ophthalmology and Oto-Laryngology of the Latin-American Congress of Medicine, November, 1922. Translated by Lloyd Mills, M.D.

The causes of paralysis of accommodation, of uncomplicated paralysis of the iridic sphincter and of the rarer internal ophthalmoplegia, which appear during the convalescence from diphtheria, influenza, typhus, pneumonia, puerperal infection, measles and other acute infectious diseases, never have been adequately explained, either as to the active principle which produces them, or as to the point and manner of the attack.

These paralyses are of interest in that they usually appear after two or three weeks of convalescence; they usually follow mild and often forgotten attacks of the original malady and they usually tend to spontaneous recovery.

The physiologic activity of the pupil

and of accommodation results from the equilibrium between the parasympathetic control of the third cranial nerve and the ciliary ganglion, and the true sympathetic control of the superior cervical ganglion. The type of disturbance of this equilibrium determines the pathologic state.

The nuclear cells of the pupillary constrictors and those which govern accommodation are placed in the mesencephalon near the nuclei of the third nerves, forming the socalled pupillary nucleus. Fibers from these ganglion cells unite with the fibers from the third nerve, accompany them to the ophthalmic ganglion, where they separate to perform their separate ganglionic articulations. Experimental studies of ciliary

ganglion function by means of electrical stimulation, by destroying the ganglion and by the use of poisons like nicotin, show that this ganglion is the motor center which controls pupillary constriction and accommodation. It is essentially a motor ganglion, in that the sensory and the sympathetic roots merely pass thru, without actually becoming part of the ganglion and without forming nervous unions there. The short ciliary nerves, thru which the work of this ganglionic motor is effected, form rich plexuses in their passage thru the scleral wall, in the ciliary muscle, the root of the iris and in the limbal region. The majority of these are vasomotor.

Intrinsic ocular paralyses may arise, of course, from involvement of the basal nuclei or from oculomotor neuritis, as is clearly shown by the constancy with which this symptom appears at the height of lethargic encephalitis. involvement however, usually has other clinical contexts which identify its type and location. It seems most likely therefore that the points in the nervous chain which have been shown by physiologic experimentation to be most susceptible to the strain of overwork, and to the effects of poisons, such as curare, nicotin, atropin, etc., are the focal points of the pathogenic process. Such points are found in the "receptive substance" of the neuromuscular articulations and the synaptic articulations, or points of nervous discharge between the dendrites of the ganglion cells of the ophthalmic ganglion and the incoming neuraxons.

Experiment and clinical study have shown that a number of substances exist, like adrenalin and thyroid, which not only work by selection either upon the parasympathetic or the true sympathetic system, but which may restrict their effects to such very limited portions of these systems as ganglion cells or neuromuscular synapses. Langley proved, for example, that the effect of nicotin was limited to the synaptic articulations between the ganglion cell and the incoming neuraxon, without disturbing the function of the fibers leaving the gang-

It is not illogical to assume, that during convalescence from the diseases in

question, substances are present in the blood, which exert a selective paralyzant effect upon the receptive substance of the neuromuscular synapses in the iris and ciliary muscle, and of the ciliary gang-lion. The localization and intensity of this effect determine the degree and completeness of the resulting paresis Thus if the poisonous substance affects a single ganglion, a more or less complete internal ophthalmoplegia of the corresponding eye is the evidence. If the paralyzant action is limited to the neuromuscular synapses of the accommodative muscle a pure accommodative paralysis appears, now unilateral, as in influenza and again bilateral, as is more often the case in diphtheria. At times the result is merely accommodative asthenopia, as occurs especially after typhus. The explanation of this would seem to be an intoxication of the neuromuscular synapse capable of producing a rapid fatigue of the receptive substance, but insufficient to cause paralysis. This supposition is supported by the fact that the motor plaque of the striped muscle is the point where signs of fatigue are manifest, rather than in the muscles or nerves themselves; and in the unstriped muscle, of course, the synapse represents the motor plate.

The instillation of eserin in these characteristic pareses produces temporary miosis and ciliary contraction, for the patient becomes able to read at 30 cm. without requiring the addition of the plus spheres of from 2.00 to 4.00 D., which were needed before the miotic was used. Here the paralyzing action of the toxic substance is partly neutralized by the eserin in the same way that eserin can partly neutralize the paralyzing action of curare upon the motor plates of

Ranvier.

The action of atropin, which paralyzes the iridic sphincter and the ciliary muscle, is by diffusion thru the ocular issues until it reaches its point in the neuromuscular articulation. This is also the point of attack when pupil and accommodation are paralyzed in systemic atropinism. These effects, like those which appear after the contagious diseases in question, must be of the nature of an intoxication, a physico-

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chemical action, rather than an actual alteration of tissue, in order to explain the tendency to spontaneous recovery.

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Several facts are of significance in considering the origin of the hypothetic paralyzant: The pareses usually occur after two or three weeks of convalescence when they can no longer be attributed to the direct or local action, either of the pathogenic organisms or They most often follow of their toxins. light cases of the general disease and, taking diphtheria as an example, while such paralyses are much less frequent since the introduction of curative sera. if the paralysis has actually appeared. the serum has no effect upon its evolution.

The hypothetic paralyzing substance is not a specific product, inasmuch as various toxins provoke its production in the unrelated diseases of diphtheria, typhus, pneumonia and influenza. It is probably derived from the action between the bacterial toxin and the body

cells which are reacting against the toxic attack. The experiments of Abderhalden have shown that organic cells have the property of evolving defensive proteolytic ferments upon contact with foreign substances, the function of these ferments being to disintegrate and digest the invading material. New substances, such as the toxones of Ehrlich's sidechain theory, arise out of this interaction and may be considered as responsible for these late paralyses. When, as in diphtheria, specific sera are used to prevent or lessen the effect of the bacterial toxin upon the body cells, the reactive substance will not be produced.

It seems likely that the paralyzant substance is not produced thruout the whole duration of the paralysis, but that when it is once put forth in sufficient amounts, it becomes fixed at the synapses until it can be eliminated slowly, as in the case of the instillation of a single drop of atropin.

### FACTORS DETERMINING THE CHOICE OF OPERATION IN GLAUCOMA.

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The history of the operative treatment of glaucoma and the attempts to elucidate its pathology are briefly reviewed. An operation is described in which the sclerocorneal coat is opened by a small oblique keratome incision. This is later extended with scissors after which an iridectomy may be made or not. The writer's experience has uniformly been favorable. Two cases in which complications occurred are noted. Read before the Colorado Congress of Ophthalmology, Denver, July, 1923.

Colonel Robert Henry Elliot, than whom no ophthalmologist of the present day has a better right to express an opinion, states in the introduction to his "Treatise on Glaucoma" that "the term Glaucoma is not the title of any single disease. It is rather a convenient clinical label for a large group of pathologic conditions, the distinctive feature common to all of which is a rise in the intraocular pressure." He adds that "the causes of these conditions are many and varied, the pathological findings are most diverse, and the difference in the symptoms presented so extraordinary that very careful study is required to detect the bond which serves to unite these very dissimilar manifestations of disease in a common category. When we speak of the hardness of a glaucomatous eye or of its rise in tension, we are referring to the outward manifestations of an increase of the fluid pressure within the globe. To this increase all the causes of glaucoma lead up; on it every sign and symptom of the condition depend.

"If the rise in pressure can be traced to the action of some antecedent local disease, we speak of the glaucomatous condition as secondary; failing this, we term it primary.

"The presence of an increase in intraocular pressure necessarily brings about some measure of interference with the free escape of blood from the interior of the eye to the surface. So long, however, as such interference does not give rise to obvious congestion of the eye or of its conjunctiva, we speak of the condition as 'simple or noncongestive glaucoma.' When evidence of interference with the venous return makes its appearance, the disease is said to be 'congestive.' The term 'inflammatory,' though often used in this connection, is erroneous and should be dropped."

This general introduction to the subject by Col. Elliot is so admirably concise that we could not do better than to quote it verbatim, tho some of us may not agree to his dogmatic dismissal of the term "inflammatory" glaucoma. In discussing the surgical treatment of glaucoma, we shall not attempt a recapitulation of the "most diverse pathologic findings" and the "extraordinary . . . difference in the symptoms" referred to by Elliot, nor shall we try to answer the questions "when" or "why" to operate. Our present purpose is to invite your critical discussion and advice for the selection of some method, or a combination of methods among the many that have been proposed, to secure relief from

intraocular hypertension. In presenting surgical methods for the reduction of intraocular hypertension, without a truly scientific interpretation of its etiology and pathology, we have a most distinguished precedent in the history of ophthalmic practice. Graefe's introduction of the operation of irredectomy for the relief of glaucoma was hailed as one of the greatest triumphs of ophthalmic surgery, yet it was attempted by him upon a purely empirical basis. With his usual keen clinical observation, von Graefe had noticed that in some cases of corneal opacity, where an iridectomy had been done for visual purposes, a reduction of tension had fol-lowed the operation. The story is that in December, 1856, a patient who had previously lost his right eye thru glaucoma suffered an attack in his left eye. He presented himself merely for relief from the intense pain, having completely lost even perception of light

in the remaining eye. Von Graefe performed an iridectomy, and fortunately in this first case the result achieved surpassed all expectations. Intraocular tension became normal and pain ceased at once, and vision gradually improved until he was able after a few months to read ordinary print.

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Prior to this experience, the statement of Jules Sichel (1833) that "there exists no authentic example of the cure of glaucoma and reports of cures or of relief by operation merely indicate errors in diagnosis or terminology" had remained practically unchallenged.

Von Graefe is said to have repeated this operation almost daily during the remaining 15 years of his life, yet in his last paper published in 1870, reviewing the remarkable clinical success, he wistfully regrets his inability to arrive at a satisfactory understanding of the etiology of glaucoma, or to account for the favorable effect of an iridectomy.

To substitute fifty per cent of cures for an absolute failure in the treatment of any disease is truly a remarkable achievement. Von Graefe did better than that, but in quite a few cases the apparent cure was not permanent. This was especially true of the chronic noncongestive cases. In regard to the latter Elliot quotes von Graefe as follows: "Iridectomy exerts a temporary favorable influence even in chronic glaucoma, and since this therapeutic action is at all events superior to the curative effect of any other method of treatment, it is our duty to continue it." Disappointments following simple iridectomy were voiced by Axenfeld, de Lapersonne, Panas, Schmidt-Rimpler, Snellen, and Voelkers and others. Hansen Grut, Professor of Ophthalmology in Copenhagen until his death in 1907, is properly designated by Elliot as one of the greatest of the Old Guard of Ophthalmology. Grut states "that the deception incident to the treatment of glaucoma was one of the most prolific causes for chagrin throughout his long ophthalmological career." Fuchs recognized that most iridectomized cases, if they live long enough, ended in blindness, but added that at any rate the progress of the

disease was so delayed that a valuable service had been rendered to the pa-Both the success and the occasional failure of the operation required further research for interpretation.

The first important discovery was the significance of the iridocorneal angle in the drainage of fluids from the anterior chamber of the eye. In 1858 Donders had reported finding a firm adhesion between the anterior surface of the iris and the posterior surface of the cornea, thus blocking this angle at the base of the iris in glaucomatous eyes which he had examined. He correctly assumed that this pathologic condition was due to excessive intraocular pressure, but the function of the iridocorneal angle was not then understood and Donder's observation meant nothing.

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In 1880 Laquer reported the usefulness of miotics in the treatment of glaucoma. Miotics contract the sphincter muscle of the iris, drawing the iris tissue from its base toward the center of the pupil, while, at the same time, the contraction of the ciliary muscle retracts the root of the iris. Both these actions tend to open the spaces of Fontana in the pectinate ligament in the iridocorneal angle, and thus to provide free access for the fluid contents of the anterior chamber to the canal of Schlemm, which encircles the cornea at the limbus and is drained by a plexus of veins. These facts concerning the drainage of fluids from the eye were discovered by Leber. Then, the unsuspected significance of the observations of Donders was confirmed by Knies, the researches of Weber Treacher Collins, and others. the possible reasons for the success of iridectomy lay in the fact that the operation might open up this irido-Its failure in later corneal angle. stages and in chronic cases might be explained by the firm adhesions between the base of the iris and the cornea resisting even the traction used by the operator in making the iridectomy. These deductions did not always prove to be in full accord with the facts. Small iridectomies sometimes more effective than large ones, hence

the opening of the angle was not the only factor. Subsequently two other interesting facts concerning the relation of the iris to the problem of intraocular drainage were discovered.

First, we are reminded that the iris is essentially vascular tissue with more or less pigmentation. It hangs loosely in front of the crystalline lens and is freely bathed, whether at rest or in motion, by the aqueous fluid. The iris, therefore, absorbs quite a quantity of the fluid thru its own veins and the perivascular spaces or crypts-regardless of the condition of the iridocorneal angle. Hence miotics may exert their favorable influence in glaucoma in a large measure by unfolding the iris as the pupil contracts, thus offering a larger surface for immediate contact with the aqueous, enabling a correspondingly greater absorption. That means more drainage of fluid from the eye into the efferent vessels.

liar behavior of the cut surface of iris Elliot states "We know that aseptic iris wounds show no tendency to scar formation or healing but remain indefinitely in the condition produced by the operation." Parsons in his "Pathology of the Eye" says of wounds of the iris: "There is little or no formation of granulation tissue unless the iris is prolapsed and exposed, consequently also there is no formation of true scar tissue." In T. Henderson's paper on the "Histology of Iridectomy" he noted "that the iris is absolutely indifferent to trauma, as such, so long as it is not subjected to toxic or septic agencies." Hence, if the

The second fact concerns the pecu-

tissue remain patulous, we may assume more rapid absorption of the aqueous fluid than by mere contact with the external surface of these veins. Here we seem to have another factor in the success achieved by iri-

veins thus opened by incision of iris

dectomy.

Long before these laboratory reports were made, Fuchs had noticed that penetrating wounds of the iris often did not heal but remained open and transmitted the fundus reflex on ophthalmoscopic examination. He applied this observation practically for the relief of the secondary glaucoma incident to iris bombé by simple trans-

fixion of the iris.

Fuchs' success in this condition by opening direct communication thru the iris prompted others to experiment with various methods of transfixion of the iris in primary glaucoma. The relief from excessive tension following these attempts has not been sufficiently certain or lasting to warrant its substitution for iridectomy in the majority of cases. Elliot says "they accomplish nothing which could not be done more efficiently and without greater risk by iridectomy."

Attempts to secure atrophy of the iris tissue at the limbus by direct application of heat are also quite uncertain and may occasion the loss of valu-

able time.

There is no escape from the laws of physics in planning any surgical procedure. If the pressure within the eyeball exceeds the pressure within the veins, at their points of exit, it will certainly interfere with the drainage of fluids from the eye. In order to meet this purely mechanical problem, most recent operators have tried in various ways to secure a filtering or fistulous cicatrix. Von Graefe had noted the occasional formation of a filtering scar after simple iridectomy, but to de Wecker of Paris belongs the credit for special emphasis on this point. It was noted that a bit of iris prolapse after a cataract operation would form a cystoid scar and that these eyes remained soft. Then attempts were made to secure entanglements of iris tissue in the sclerocorneal wound after iridectomy for a similar effect. Some operators even expressed the opinion that the less skilfully an iridectomy was performed the better its influence upon intraocular tension.

To recapitulate in detail the various methods having for their object the filtration of intraocular fluids into the scleral and episcleral tissue would be an unwarranted infliction upon this You are as familiar with audience. them as the writer. They include various methods of mutilating the lips of the wound and excision of scleral tissue or trephining with or without The intentional subconiridectomy. junctival incarceration of a fold of iris tissue to insure drainage from the anterior chamber is likewise practiced, but creates too great a risk of chronic uveitis and even of sympathetic ophthal-

Posterior sclerotomies and Heine's operation of cyclodialysis, detaching the ciliary body from the sclera to establish direct communication between the anterior chamber and the suprachoroidal space, achieved such limited success that practically they have been

abandoned.

Any foreign substance, no matter how benign, when imbedded in the ocular tissues excites exudate and becomes encapsulated. It is hardly a logical procedure, therefore, to attempt to secure permanent drainage by inserting gold or silver wire, or horsehair setons.

In discussing the operation to be described more fully below than when presented last year at the meeting of the American Ophthalmological Society in Washington, Treacher Collins emphasized the importance of a permanent gap in the endothelium lining the anterior chamber, if constant filtration is to be secured. He added that "an aseptic wound at the corneoscleral margin kept bathed with aqueous will not heal and will not form granulation tissue. So we can make a permanent subconjunctival opening in the sclerocorneal tissue at an angle of the anterior chamber." According to Collins the three causes of failure in such operations are "leaving Descemet's membrane intact," "sepsis, leading to the formation of granulation tissue," and "downgrowth from the epithelium at the surface between the lips of the wound. That is most liable to occur if we do not get a good conjunctival flap or if we make a buttonhole in it."

Summarizing, we may assert on the basis of the experience of ophthalmic surgeons thruout the world, the first successful surgical intervention by von Graefe sixty-six years ago, that a filtering cicatrix covered by the conjunctiva and the superficial lamellae ( bine iride from ante the ( hope age com

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otl ho the op lae of the cornea at the limbus, combined in most cases with an aseptic iridectomy, maintaining a free passage from the circumlental space into the anterior chamber and if possible into the canal of Schlemm, affords the best hope of securing the permanent drainage so essential for the cure of glaucoma.

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### OPERATION RECOMMENDED.

We may now select a technic which promises such efficiency with the highest degree of safety.

"Unfortunately, absolutely the worst conceivable form of sclerocorneal wound, as regards the danger of late infection, is a round hole beneath the adherent limbus."

Practical experience has shown us that ample drainage may be secured and other complications avoided by creating an irregular slit like opening which may be partially healed, leaving tiny passages between the trabeculae of tissue uniting the edges of the wound.

The third step in the operation to

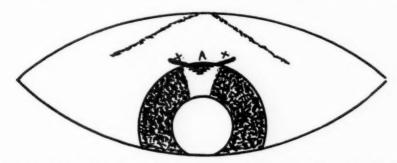


Fig. 1.—Diagram showing Luedde's operation for glaucoma. Upper sloping lines, conjunctival incision.

A, keratone incision oblique to sclerocorneal surface. x x incisions made with scissors at either end of keratone incision. These "wings" are perpendicular to the scleral surface.

First, we shall follow Elliot's proposal by making a large thick conjunctival flap. The small flap which he used when he first presented his trephine operation did not prove nearly so satisfactory. We have noted that an aseptic operation is desirable. The surface of the conjunctiva cannot be rendered absolutely sterile, therefore it is much safer to enter the eyeball from the subconjunctival tissue after the flap has been raised.

Second, we may include splitting the cornea at the limbus for one or two millimeters, if possible. If we can sesure interlamellar separation of corneal tissue we may get a slight amount of interlamellar drainage.

Thus far we follow Elliot, but shall we not endeavor to substitute some other form of opening for the round hole (1 to 3 mm. in diameter) left by the trephine in his operation? Such an

the trephine in his operation? Such an opening is too often complicated by prolapse of uveal tissue, chronic uveitis, and "late infection." With reference to the latter Herbert states.

secure such a scar is the introduction keratome obliquely thru the corneal tissue, into the anterior chamber at the lower margin of the flap, thereby making a tiny beveled valve like perforation not over two milli-This can be accommeters wide. plished with scarcely the loss of a drop. of aqueous fluid. Thus, we avoid too sudden a release of the excessive intraocular tension such as may follow any larger or less controllable opening. Sudden release of tension often at the very outset destroys every chance for the success of the operation by giving rise to deep intraocular hemorrhage or extensive prolapse of intraocular tis-The small initial opening, here proposed, can be touched gently and repeatedly with a spatula, permitting more fluid to be withdrawn gradually, drop by drop, until the eyeball has become quite soft. This can be determined by touching the sclera with the spatula and noting the degree of re-

Fourth, the initial opening may then

be safely enlarged by introducing the rounded tip of a thin-bladed pair of scissors and making a cut of about two millimeters laterally from both the nasal and temporal angles of the original keratome incision. Thus we secure a "winged" keratome incision. The central portion is the original smooth beveled wound whose two lips lie in close apposition. This is flanked on each side by a vertical cut from the scissors thru the corneal tissue. The irregular character of this wound does not permit the formation of a firm linear scar.

The escape of aqueous indicates that Descemet's membrane has been punctured. The tip of the keratome would cause the lips of the wound in this membrane to be pushed into the anterior chamber. The compressing action of the blades of the scissors would cause Descemet's membrane and its endothelium to be bent outward into the wound separating the sclerocorneal tissue. The irregular gap thus torn thru seems to show no more tendency to be covered by endothelium than does the clean circular opening after trephining.

Fifth, at this stage an iridectomy, large or small, may be done at the discretion of the operator, or it may be omitted and the operation finished by replacing the flap. If no iridectomy is done we have in effect a keratotomy which in certain cases may be more desirable. In addition to a simple iri-dectomy, it may be deemed advisable to add the detachment of the ciliary body, from before backward (a reversed Heine operation), according to the method recently proposed by Török at the meeting of the American Ophthalmological Society at Colorado Springs. Having no personal experience with this method, the writer can offer no testimony as to its merits. The question to be decided is whether its benefits are greater than the risk incurred by the additional trauma and manipulation.

By the use of our technic in the last three years, we have secured striking examples of subconjunctival fistulation. Tension has remained well

within normal limits and surprisingly constant and uniform. Two exceptions must be noted. The first was a patient suffering from simple chronic glaucoma. One eye had been enucleated on account of severe pain (absolute which followed simple glaucoma) In the second eye, in iridectomy. above technic was used which the one year later, severe, recurrent, hemorrhages complicated the convalescence after forty-eight hours. He also had bloody stools and showed a variable systolic blood pressure, ranging from 95 to 200 mm. within twenty-four hours. If this complication had been anticipated no iridectomy would have been undertaken. A keratotomy following this same technic might have been successful. His eye is now quiet and tension practically normal, but the small vestige of vision which it was hoped might be saved when he rather tardily consented to have an operation performed was lost during the stormy period immediately after the operation.

The second was a case of inflammatory (or congestive) glaucoma, in which extensive posterior synechia of the iris made it impossible to get a perfect iridectomy. As has been stated about the operation of trephining, if complete relief is not secured by the first operation there is no good reason why it may not be repeated. So far we have not repeated the operation in any case, but it was suggested that we do so for this patient. However, the regular use of myotics proved to be all that was required to maintain good vision, normal tension, and to keep the eye free from congestion or photo-

phobia.

Special emphasis should be given to the element of safety provided by the gradual reduction of excessive intraocular tension thru the tiny initial kera-

tome incision.

If any better type of fistulating scar can be developed we shall all be ready to adopt it, but the use of the technic above outlined has been so consistently satisfactory in our experience that we have no hesitation in recommending it for a trial.

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### SARCOMA OF CHOROID.

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Five cases are here reported in abstract; one of them was under observation ten years before evidence of the sarcoma was noticed, and there has been no recurrence in nine years following enucleation. The important points of diagnosis and the question of metastasis are discussed. Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, January, 1924.

The diagnosis of the presence of tumor of the choroid presents no especial The patient complains only of partial loss of vision and his attention is attracted to his eyes solely for this reason. He has no pain and singularly no photopsia. The eye is not congested and its appearances are unaltered. With the ophthalmoscope the detached retina, fixed over most of its extent if not entirely, seen with convex lenses of varying strength because of the different levels of the tumor, with the transilluminator, when the growth is not limited to the posterior portion of the fundus; with the perimeter which outlines graphically the extent of the invasion, the diagnosis is made.

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Case 1. Mr. B., aged 41, came under my care in November, 1904, for the relief of accommodative asthenopia. The media were clear and the eye grounds normal. In 1908, the eyes were healthy and vision, with correcting glass, of full acuity. In 1913 no change except a slight increase in hyperopia. In 1915, V. of L. was reduced from 20/15 to 20/20. The retina over a small area below was detached. The diagnosis of choroidal tumor was made. Enucleation advised and refused. Six months later vision was reduced to perception of light in the lower field. A yellow vascular growth was easily seen occupying a large part of the vitreous. Tension

mation: Spindle celled sarcoma.

Case 2. (Reported in the Trans. Am. Oph. Soc. 1919.) Mrs. P., aged 39, loss of vision in left eye during past few weeks; no pain, no inflammation. Tension normal. Diagnosis, choroidal tumor. The ball was enucleated and a gold sphere implanted in Tenon's cap-

normal. On December 27, 1915, the eye

was enucleated and a gold sphere im-

years have elapsed and he is in appar-

ently perfect health. Pathologic exam-

planted in Tenon's capsule.

sule. Pathologic examination showed the growth to be melanotic spindle celled sarcoma.

Case 3. Mr. P., aged 69, consulted me October 15, 1923, stating that for 6 months V. of R. eye had been declining and now equals hand movements on nasal side. L. V. with correcting glass of full acuity. No pain. Health good. Large round tumor involving the entire nasal fundus readily seen with ophthalmoscope. Dense shadow in transillumination. The eye was enucleated the following day. Path. report: Spindle celled sarcoma.

Case 4. D. age 40. Tumor projecting forward from the nasal section of the choroid concealing the disc from ophthalmoscopic view. Shadow cast by transillumination. No light perception on large part of the temporal field. Tension normal. No evidence of metastasis.

Case 5. Mrs. H. The only symptom was decline in vision. The entire lower third of retina of left eye was detached. Tension normal. No pain. Enucleation with implantation of gold sphere. Pathologic examination; Melanotic sarcoma.

The two points of especial interest in connection with these and all cases of choroidal malignant growth are 1st, the tension, and 2nd, metastasis. The first point was discussed in the paper above referred to. The writer has found no reason to modify the view there expressed, namely that the tension of the eyeball is not raised until the crystalline lens is pushed forward, the anterior chamber annihilated and the angle of the anterior chamber choked with iris tissue. The only plausible explanation is that the vitreous humor is absorbed as the tumor grows and the normal relation between intraocular secretion and excretion is not disturbed. Plus tension therefore is not a diagnostic sign of the presence of intraocular tumor per se. the contrary hypotony may be present.

Nearly 9

Franz, (Klin. Monats. f. Aug. V. 64. 1920) describes 3 cases all of which were tumors affecting the ciliary body. He says the hypotony may be due to the resulting decrease in the secretion of the aqueous. L. M. Francis (Trans. Amer. Oph. Soc. 1920) reports a case of choroidal melanosarcoma in which the tension taken at four different times showed a steady decrease from 20 mm. to 5 mm. during 2½ years. Heymans, (Arch. Ophthal. V. 38, 1921) showed 12 cases of which four had hypotension, two normal tension, and six plus tension. No definite relation was observed between the tension and the size or location of the tumor; but in all with hypertension the filtration angle was more or less completely effaced.

2. Metastasis. The point is an important one and unfortunately we have few facts by which we may be guided in giving an opinion as to the origin of the original disease. The means of transmission of the germs or toxins or cells are the blood streams or the lymph streams or both. Many cases are recorded of the metastasis from other organs of the body to the eye and in one recent instance from one eye to the other. Doesschat (A. J. O. V. 4, 1921) reported the case of a woman who had been operated on six years before for melanosarcoma of the mamma. Three years later both eyes contained choroidal tumors. At postmortem a large tumor was found in the left eye and five separate tumors in the retina of the right eye, mixed leucosarcoma and melanosarcoma.

This is stated to be an instance of metastasis from the breast to the eyes and from the left to the right eye. An example of metastasis from the eye to the liver is the case of Velhagen (Klin. Monats f. Augenh. V. 64, 1920). After enucleation the eye showed two sarcomata, the larger one composed of small, round cells probably secondary to the other. The patient died after eight months, of metastasis to the liver. Instances of metastasis are common in the literature. If we admit metastasis from the liver to the eye it is logical to assume metastasis from

the eye to the liver. My own opinion, however, based on my experience, is that the former is far more common. and that in some in which it is stated that the choroid was the site of the original tumor, I am inclined to believe that the cells were inplanted first in some other organ and that this earliest collection was undiscovered. mortem examinations depended on to demonstrate multiple tumors, do not prove that metastasis proceeded from the eye. In order to decide the question, thoro analytical tests must be made of as many of the bodily secretions and organs as may be available. The question is one of academic rather than of practical interest because it is the usual custom to practice early enucleation after a positive diagnosis of choroidal tumors that are presumed not to be syphilitic. As stated in my paper previously referred to, early enucleation cannot prevent metastasis because absorption and transference of tumor cells may take place at any time after the cells have appeared in the choroid. Early enucleation is recommended to prevent pain, and involvment of the other orbital tissues and to rid the body of a malignant growth.

In conclusion, I desire to quote a few passages from the splendid treatise of Ewing on Neoplastic Disease which, while not contributing to our knowledge of metastasis from the choroid to other organs, are of interest. He says the rather common occurrence of two or more tumors in different organs of the same subject suggest nothing more than the accidental coincidence in several organs of the general etiologic factors in the genesis of tumors. Metastasis is accomplished thru the lymphatics either thru "continuous permeation" or the development of a secondary growth at the end of a chain of cancer cells filling the deep lymphatics or thru "cell emboli" lodging at different points in a lymphatic chain. It may grow in both directions and after a time fill the lymphatic completely. The comparative immunity of lymphatics against invasion of sarcoma cells is probably to be explained chiefly by the cells some The cells some astas stage

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The blood vessels are the chief channel of the extension of sarcoma. Metastasis is observed in the advanced stages of most sarcomas and it is characteristic of the disease that, with rare exceptions, embolic cells travel thru the blood vessels. The metastasis often occurs much earlier than is generally conceived and this fact adds to the gravity of the prognosis after surgical operations.

### MUSCLE RETROPLACEMENT IN THE CORRECTION OF SQUINT. SIMPLIFIED TECHNIC. REPORT OF CASES AND RESULTS.\*

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The operation here described seeks to secure exact results by ensuring the adhesion of the tenotomized tendon to a definite selected place on the sclera. The special technic for accomplishing this is described and tabulated details regarding fifty-five cases submitted to it are reported. The cases were treated at Bellevue Hospital and the New York Eye and Ear Infirmary.

In reporting this series of cases it is my purpose to point out the value of the operation of retroplacement of the overacting muscle in preference to tenotomy and guarded tenotomy, and also in place of muscle advancement, or resection in squints of moderate degree. Recently, P. C. Jameson reported a number of cases in which a similar operation was done with good results. The old control ligature after complete tenotomy, without suture to the episclera seems to me rather uncertain, just as is the operation of complete tenotomy, for, while it is not likely to be followed by complete loss of power, the muscle stump may become attached too near the original insertion, or over too broad an area. A control suture is intended to hold the tenotomized muscle fastened to the original insertion, the muscle being allowed to recede as far back as necessary. It appeared to me, that this simple procedure could be made more exact by picking up the episclera at the point to which it was decided to retroplace the insertion of the muscle, so as to prevent the cut end from sliding up when tying the ligature, at the same time keeping it in close apposition with the episclera.

TECHNIC OF THE OPERATION.

1. Vertical incision thru the conjunctiva over the attachment of the muscle.

2. Opening of Tenon's capsule at the lower level of the attachment.

3. Muscle hook passed thru the opening, under the muscle, to the upper level of the attachment.

4. Opening of Tenon's capsule at the upper level of the attachment.

5. Conjunctiva and caruncle dissected away from the muscle.

 Parallel incisions thru Tenon's capsule at upper and lower borders of the muscle.

7. Double-armed suture passed thru the muscle with loop on the scleral side. This is best accomplished with one of the needles, which enters at a point 1 mm. below the upper border of the muscle; and, disappearing under the muscle, emerges at a point 1 mm. above the lower border of the muscle. The ligature is passed 3 mm. beyond the line of insertion of the muscle.

8. Complete tenotomy.

9. The muscle hook is passed under the muscle on each side, to make sure that the tenotomy is complete.

10. At a point on the line to which it has been decided to recede the muscle, pick up the episclera, passing the needle horizontally toward the original insertion for a distance of about 1 mm., under the episclera, then emerging pass the needle thru the

<sup>\*</sup>Reported at the meeting of the section on ophthalmology of the N. Y. Acadamy of Medicine March 19, 1923.

stump of the original insertion, in the same manner as in muscle resection; finally turn back and pick the conjunctiva, which has retracted to the inner canthus. Follow the same procedure with the other needle. The course of the upper and lower needles should be about 4 mm. apart. After the needles are removed, the two ends are tied over the conjunctiva, having first been pulled taut. The conjunctiva is pulled thus over the muscle stump, closing the wound. In tying the ligature great care should be exercised not to allow the muscle to slide back, as that would result in too much recession with overcorrection, or loss of muscle function.

To determine the amount of retroplacement necessary I followed certain rules. Deviations were measured by the use of the perimeter, and light reflex. 1 mm. retroplacement was allowed for each 5° of deviation. Thus, for 20° of arc deviation, the muscle would be retroplaced 4 mm. from the line of the cut end of the muscle attachment. In patients with converggent strabismus showing 10 to 30° arc deviation, only retroplacement of the internal rectus was performed, and generally, resection of the external rectus was found unnecessary, particularly, if the patient had normal power of abduction.

In squints of higher degree, Reese resection of the external rectus, in addition to the internal rectus operation, was performed.

In alternating convergent squints,

retroplacement of both internal recti gave satisfactory results. Thus, a 40° deviation would indicate a 4 mm. recession of each internal rectus. In cases of convergent squint with spasm of the inferior oblique, causing a marked vertical deviation, the combination of tenectomy of the inferior oblique with recession of the internal rectus seemed to produce the desired effect. In divergent squints a 5 mm. retroplacement of the external rectus was substituted for tenotomy.

In determining the amount of recession, we must take into consideration acuity of vision, the error of refraction and the strength of the opposing muscle.

In conclusion I wish to emphasize the following points in favor of the operation: its simplicity, brevity, painlessness, comparative exactness of correction, the fact that in moderate deviations this modified tenotomy is a useful operation and makes advancement, or resection of the external rectus unnecessary. When muscle resection in marked deviation is required, recession is more effectual than guarded tenotomy and safer than complete tenotomy.

Careful dissection prevents sinking of the caruncle.

Most of these cases are taken from the records of the eye service of Bellevue Hospital; a few from the N. Y. Eye and Ear Infirmary. In conclusion I wish to thank Dr. Chas. H. May for the free use of operative material.

### SUMMARY OF CASES.

|       |      |                           |                      |           | O C MANAGEMENT                                    |                           |                       |   |   |
|-------|------|---------------------------|----------------------|-----------|---|---------------------------|-----------------------|---|---|
| Case. | Age. | Vision.<br>20/20<br>20/50 | Deviate Hor. OD. 15° | Vert<br>0 | Static<br>Refract.<br>+7.+1.5×105°<br>+8.+1.5×75° | V. cor.<br>20/30<br>20/30 | eviatio<br>cc.<br>15° | Operation. Recession Int. Rect. 3 mm.   | Result. Eyes normal with lenses.                  |
| 2.    | 21   | 20/40<br>20/70            | OS. 25°              | 0         | +1.5+.75×90°<br>+2.5+.75×90°                      | 20/30<br>20/30            | 25*                   | Resection and<br>Ten; Recession<br>Int. Rect. 4 mm.                               | Improved to 15° esotrop.; Improved to 5° esotrop. |
| 3.    | 13   | 20/100 20/30              | OD. 15*              | 0         | +1.5+.75×90°<br>+1.+.25×90°                       | 20/100<br>20/20           | 15*                   | Recession Int. rect. 3 mm.  | Absolute correction.                              |
| 4.    | 9    | 20/70<br>20/20            | OD. 35°              | 0         | +3.+1×160°<br>+3.+.37×180°                        | 20/50<br>20/20            | 18*                   | Recession Int.<br>Rect. 5 mm.   | Improved to 5° esotrop.                           |
| 5.    | 4    | 20/30<br>20/200           | OS. 45°              | 0         | +1.75+.50×90°<br>+2.75+.50×90°                    | 20/20<br>20/200           | 35*                   | Recession int.<br>rect. 5 mm.<br>Resection ext.<br>rect.                          | 20° error<br>remained.<br>5° error<br>remained.   |
| 6.    | 10   | 20/20<br>20/200           | OS. 45°              | 15°       | +4.+.50×90°<br>+4.+.50×120°                       | 20/20<br>20/70            | 45°                   | Tenectomy Infer.<br>Obl. Recession<br>Int. rect. 5 mm.<br>Resection ext.<br>rect. | 30° esotrop. 3° hypertr. 5° esotrop. 3° hypertr.  |

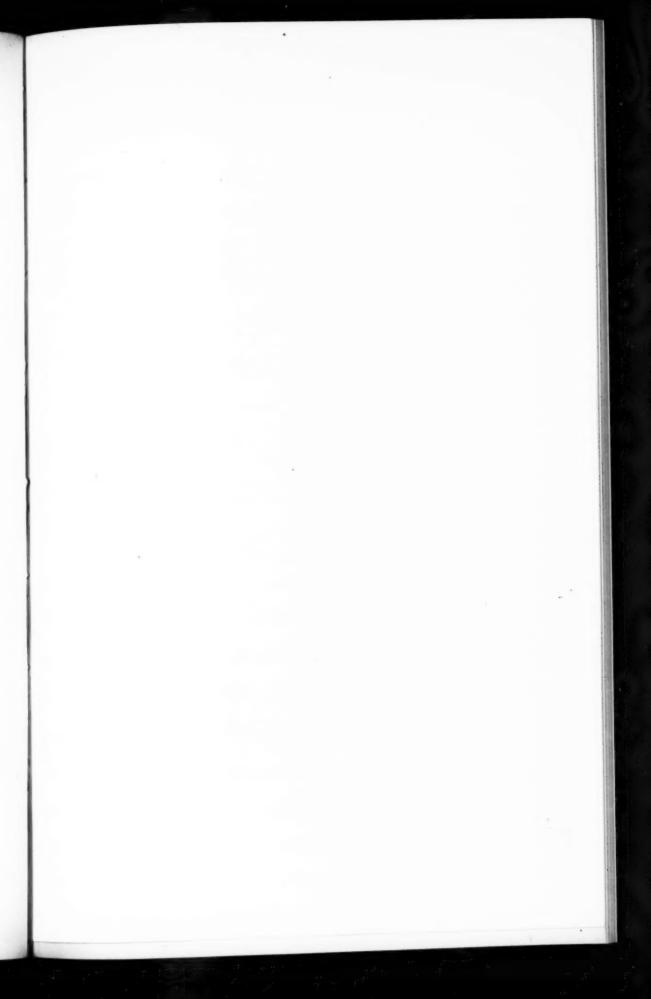
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|     | Age | Vision.                | Hot         | Deviatio     | n<br>Vert. | Static<br>Refract.               | V. cor.                | Deviation<br>cc. | Operation.   | Result.   |
|-----|-----|------------------------|-------------|--------------|------------|----------------------------------|------------------------|------------------|--|---|
| 7.  | 14  | 20/20<br>20/50         | OS.         |              | 12°        | +4.5+.75×30°<br>+4.+1.×180°      | 20/20<br>20/40         | 45°              | Tenectomy. inf.<br>Obl. Recession<br>int. rect. 5 mm.          | Absolute correction.  |
| 8.  | 6   | 20/70<br>20/70         | OS.         | 15°          | 12*        | +3.×90°<br>+.75+3.5×90°          | 20/40<br>20/70         | H. O.<br>V 12*   | Tenectomy Inf.<br>Obl.   | Straight with<br>lenses 10°<br>esotrop.<br>without lenses.            |
| 9.  | 8   | 20/100<br>20/100       | OD.         | 40*          | 4°         | +13.<br>+13.                     | 20/100<br>20/100       |                  | Recession Int.<br>Rect. 6 mm.                                  | Absolute correction.  |
| 10. | 10  | 20/100<br>20/70        | OD.         | 35°          | 0          | +6.<br>+7.+1.×100°               | 20/100<br>20/50        | 20°              | Recession Int.<br>Rect. 5 mm.                                  | Absolute correction.  |
| 11. | 55  | 20/40<br>L P           | os.         | 30°          | 0          | +1.50×90°<br>Balance             | 20/30<br>L P           | 30°              | Recession Int.<br>Rect. 5 mm.                                  | Perfect cos-<br>metic result.   |
| 12. | 5   | 20/200<br>20/30        | OD.         | 45°          | 15°        | +1.5+2.5×90°<br>+0.5+.25×90°     | 20/200                 | 40°              | Tenotomy Inf. Obl.<br>Recession Int.<br>Rect. 5 mm.            | 30° esotrop.<br>No hypertrop.   |
|     |     |                        |             |              |            |                                  |                        |                  | Recession Int.<br>R. O. S.                                     | 10° esotrop.<br>remained.   |
| 13. | 55  | 20/70<br>L. P.         | OS.         | 35*          | 0          | +.75+.25×180°                    | 20/30                  | 35°              | Recession int.<br>rect. 5 mm.<br>Resection ext.<br>rect. 3 mm. | 10° esotrop.<br>remained.   |
| 14. | 8   | 20/50<br>20/70         | OS.         | 15°          | 0          | +1.75+.25×180°<br>+1.75+.25×60°  | 20/30<br>20/50         | 15°              | Recession int.<br>rect. 5 mm.                                  | Absolute correction.  |
| 15. | 12  | 20/30<br>20/200        | OS.         | 30°          | 0          | +3.5+.50×90°<br>+4.+1.×90°       | 20/20<br>20/200        | 20°              | Recession int.<br>rect. 5 mm.                                  | Absolute correction.  |
| 16. | 8   | 20/70<br>20/20         | OD.         | 25°          | 0          | +3.25+2×135°<br>+3.25+.50×90°    | 20/70<br>20/15         | 20°              | Recession int.<br>rect. 5 mm.                                  | 10° esotrop.<br>remained.   |
| 17. | 8   |                        | OD.         | 45°          | 0          | +5.+.75×180°<br>+4.+.50×180°     | 20/70<br>20/15         | 35°              | Recession int.<br>rect. 5 mm.<br>Resection ext.<br>rect. 5 mm. | Absolute correction.  |
| 18. | 6   | 20/20<br>20/20         | OS.         | 20°          | 0          | +2.+.25×90°<br>+2.5+.25×90°      | 20/20<br>20/20         | 20°              | Recession int.<br>rect. 4 mm.                                  | 8° esctrop.<br>remained.  |
| 19. | 6   | 20/30<br>20/200        | OS.         | 42°          | 0          | +3.50+.50×45°<br>+4.25+.75×135°  | 20/20<br>20/20         | 35°              | Recession int.<br>rect. 5 mm.<br>Resection ext.<br>rect. 5 mm. | Absolute correction.  |
| 20. | 20  | 20/50<br>20/200        |             | 15°<br>trop. | 0          | -3.50×15°<br>-4.50×180°          | 20/20<br>20/2 <b>0</b> |                  | Recession ext.<br>rect. 6 mm.                                  | Straight in<br>primary posi-<br>tion. Some<br>exoph.                  |
| 21. | 10  | 20/50<br>20/7 <b>0</b> | OS.<br>Exo  | 8°<br>trop.  | 0          | -275×180°<br>-262×180°           | 20/30<br>20/30         | 8*               | Recession Ext.<br>Rect. 4 mm.                                  | Slight<br>exophoria.<br>Good power<br>of converg.                     |
| 22. | 5   |                        | OS.         | 30*          | 8°         | +2.75<br>+3.50                   |                        | H 20°<br>V 8°    | Tenotomy Inf.<br>Obli. Recession<br>int. rect. 5 mm.           | 5° esotrop.<br>remained.  |
| 23. | 5   |                        | OS.         | 20°          |            | +1.5+.50×180°<br>Child would not | wear                   | 15°<br>glasses   | Recession int. rect. 5 mm.                                     | Absolute correction.  |
| 24. | 7   | 20/30 20/20            | OD.         | 25°          |            | +2.75+.25×90°<br>+2.50+.50×75°   | 20/20<br>20/20         | 20°              | Recession int.<br>rect. 5 mm.                                  | Absolute correction.  |
| 25. | 17  | 20/20<br>F 3 ft.       | OS.         | 15°          |            |                                  |                        |                  | Recession int. rect. 5 mm.                                     | Absolute correction.  |
| 26. | 3   |                        | Alte        |              | 0          | +5.00<br>+5.00                   |                        | 25*              | Recession both int. recti 3 mm.                                | Eyes straight.  |
| 27. | 12  | 20/20<br>20/100        | OS.         | 30°          | 0          | +1.50+.50×105°<br>+2.50+1.5×105° | 20/20<br>20/70         | 25*              | Recession int.<br>rect. 4 mm.<br>Resection ext.<br>rect. 4 mm. | Absolute correction.  |
| 28. | 13  | 20/50<br>20/2 <b>0</b> | OD.         | . 30°        |            | +4.00<br>+2.25                   | 20/50<br>20/20         |                  | Recession int.<br>rect. Resection<br>ext. rect. 4 mm.<br>each. | Absolute correction.  |
| 29. | 11  | 20/70<br>20/70         | Alte<br>30° | rn.          |            | +3.00<br>+2.00                   | 20/30<br>20/30         |                  | Recession both int. recti 5 mm.                                | Straight after<br>oper. 5° over-<br>correc. 3 mo.<br>after operation. |
| 30. | 13  | 20/50<br>20/70         | Alte<br>30° |              |            | +1.50<br>+2.00                   | 20/30<br>20/30         |                  | Recession both int. recti 5 mm.                                | Straight after oper. 5° over-correc. 3 mo. after operation.           |
| 31. | 23  | 20/30<br>20/30         | Alte<br>30  |              |            | +5.00<br>+4.00                   | 20/20<br>20/20         | 30*              | Recession both int. recti 5 mm.                                | Straight after operation.   |

### SIGMUND A. AGATSTON

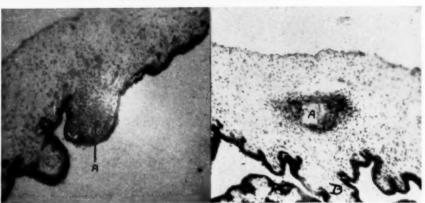
|     |    | Vision.                  | Deviation<br>Hor. Ve                |                               | V. cor.                 | eviation<br>cc. | Operation.   | Result.  |
|-----|----|--------------------------|-------------------------------------|-------------------------------|-------------------------|-----------------|--|--|
| 32. | 5  |                          | OS. 20°                             | +2.50<br>+3.50                |                         | 10°             | Recession int.<br>rect. 4 mm.                                      | Good<br>correction.  |
| 33. | 9  | 20/200<br>2 <b>0/3</b> 0 | OD. 30°                             | +4.00<br>+2.50                | 20/100<br>20/30         | 15*             | Recession int. rect. 5 mm.   | Good correction.   |
| 34. | 60 | 20/70<br>20/100          | OS. 40°<br>Exotrop.                 | $+3.00 \\ +4.00$              | 20/20<br>20/100         | 40°             | Recession Ext. rect. 6 mm.   | Good correction.   |
| 35. | 11 | 20/40<br>20/50           | OS. 30°<br>Altern.                  | +4.+1.5×90°<br>+4.+1.25×90°   | 20/30<br>20/30          | 10*             | Recession int. rect.   | Good<br>correction.  |
| 36. | 25 | 20/200<br>20/200         | OS. exotrop.<br>45° fol.<br>injury. |                               |                         |                 | Resection Ext.<br>rect.<br>Recession int.<br>rect. 5 mm.           | Good<br>correction.  |
| 37. | 18 | 20/100<br>20/20          | OD. 25° 0                           | +4.<br>+3.+1.×125°            | 20/70<br>20/20          | 15°             | Recession int.<br>rect. 5 mm.                                      | Good<br>correction.  |
| 38. | 17 | 20/20<br>20/100          | OS. 15° 0                           | <sup>+1.00</sup><br>+1.50×75° | 20/20<br>20/70          | 10°             | Recession int. rect. 4 mm.   | Good<br>correction.  |
| 39. | 10 | 20/40<br>20/100          | OS. 40° 0                           | +3.00<br>+4.+1.×75°           | 20/30<br>20/100         | 35°             | Resection Ext. rect. Recession int. rect. 5 mm.                    | 15° esotrop.<br>Eyes straight.                                 |
| 40. | 18 | 20/100<br>20/30          | OD. 20° 0<br>Exotrop.               | -2.00<br>75                   | 20/70<br>20/20          | 20°             | Recession ext. rect. 5 mm.   | Eyes straight.   |
| 41. | 18 | 20/40<br>20/200          | OS. 30° 0                           | +1.5+1.×90°<br>+3.50          | 20/30<br>20/100         | 25°             | Recession Int. rect. 6 mm.   | 5° esotrop.  |
| 42. | 5  | 20/200<br>20/30          | OD. 35° 0                           | +4.+2.×90°<br>+5.+1.×90°      | 20/200<br>20/20         | 25°             | Recession Int. rect. 6 mm.   | Corrected to 10° esotrop.                                      |
| 43. | 19 | 20/200<br>20/70          | OD. 25° 0                           | +3.+1.×90°<br>+2.+1.×90°      | 20/100<br>2 <b>0/30</b> | 25*             | Recession int. rect. 5 mm.   | Good correction.   |
| 44. | 17 | 20/20<br>20/200          | OS. 30° 0                           | +4.00<br>+4.00                | 20/20<br>20/200         | 25*             | Recession int. rect. 6 mm.   | Good correction.   |
| 45. | 25 | 20/20<br>20/20           | Altern.<br>exotrop. 15°             | 2525×30°<br>2525×150°         | 20/15<br>20/15          | 15*             | Recession ext.<br>rect. 5 mm.                                      | Good<br>correction.<br>Responds to<br>convergence<br>exercise. |
| 46. | 18 | 20/30<br>20/15           | 30° exotr.<br>for dist.<br>OD.      | 7525×90°                      | 20/20<br>20/15          | 30°             | Recession ext. rect. 6 mm.   | 15° exotrop. remaining.  |
| 47. | 7  | 20/100<br>20/200         | OS. 45° 10°                         | +4.25<br>+5.00                | 20/30<br>20/40          | 40°             | Recession int.<br>rect. O.U. 4 mm.<br>Resection ext.<br>rect. O.S. | Absolute correction.   |
| 48. | 8  | 20/200<br>20/40          | OD. 25° 0                           | +1.5+.50×135°<br>+2.25        | 20/100<br>20/40         | 20°             | Recession int.<br>rect. 5 mm.                                      | Absolute correction.   |
| 49. | 6  | 20/70<br>20/50           | OD. 25° 0                           | +4.00+1.5×120°<br>+3.5+1.×60° | 20/30<br>20/30          | 15°             | Recession int. rect.   | Absolute correction.   |
| 50. | 12 | 20/30<br>20/15           | OD. 40° 0<br>Altern.                | +3.5+.75×120°<br>+2.+1.75×90° | 20/30<br>20/20          | 30°             | Recession both int. recti 4 mm.                                    | Absolute correction.   |
| 51. | 11 | 20/20<br>F 2 ft          | OS. 45° 0                           | +2.75+.50×90°<br>+.75+2.×90°  | 20/30<br>20/100         | 45*             | Recession int.<br>rect. 5 mm.<br>Resection ext.<br>rect.           | 15° exotrop. remaining.  |
| 52. | 9  | 20/30<br>20/200          | OS. 40° 0                           | +.50+.50×105°<br>+3.+2.×90°   | 20/20<br>20/200         | 40°             | Recession Int.<br>rect. 6 mm.                                      | Good correction.   |
| 53. | 20 | 20/30<br>20/30           | OS. 45° 0                           | +1.25+2.×90°<br>+1.75+2.×100° | 20/15<br>20/20          | 30°             | Recession both<br>int. recti 5 mm                                  | Good correction.   |
| 54. | 8  | 20/20<br>20/20           | Altern, 0                           | +3.5+.25×90°<br>+4.75         | 20/20<br>20/20          | 40*             | Resection ext. rect. Tenotomy int. rect. OD. Recession int.        | 15° exotrop.<br>remained.                                      |
| 55. | 12 | 20/15<br>20/200          | OS. 30° 10°                         | +3.5+.50×90°<br>+3.+.50×90°   | 20/15<br>20/100         | 30*             | rect. OS 5 mm. Recession int. rect. 4 mm.                          | Straight on fixation. Under cover 15° exotrop. 10° hypertr.    |



1. HEALING TUBERCLE OF IRIS WITH BREAK IN DESCE. MET'S MEMBRANE AND SEC-ONDARY INVASION OF COR-NEA.

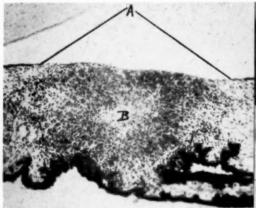
A. IRIS. B. DESCEMET'S MEMBRANE. C. TUBERCU-LOUS AREA IN CORNEA. D. SUBSTANTIA PROPRIA OF CORNEA.





2. TUBERCLE IN POSTERIOR PORTION OF IRIS STROMA. A. TUBERCLE.

3. A. TUBERCLE IN IRIS STROMA. B. IRIS PROCESS NORMAL IN RABBIT.

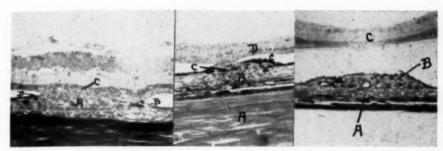


4. HEALING TUBERCLE OF IRIS SHOWING ABSORPTION OF ANTERIOR PIGMENT LAY-ER. A. EDGE OF PIGMENT LAYER. B. TU-BERCLE.



5. TUEERCLE INVOLVING SPHINCTER OF IRIS. A. CORNEA. B. TUBERCLE OF IRIS.

CORNEA AND IRIS LESIONS PRODUCED BY DEAD TUBERCLE BACILLI (FINNOFF).



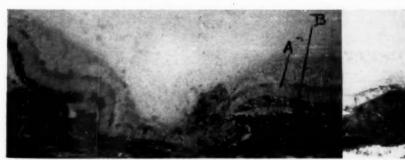
1. SCAR IN CHOROID WITH ADHERENT RETINA. OF CHOROID WITH PRO-A. SCAR IN CHOROID. B. LIFERATION OF PIGMENT PIGMENT EPITHELIUM. C. EPITHELIUM AND PARTIAL OUTER NUCLEAR LAYER ATROPHY OF RETINA. A. OF RETINA.

2. HEALING TUBERCLE SCLERA. B. TUBERCU- IUM. C. RETINA, DETACH-LOUS AREA. C. PROLIF- ED PORTMORTEM. ERATED PIGMENTED EPITHELIUM. D. RETINA.

3. PROLIFERATED PIG-MENTED EPITHELIUM OV-ER HEALED TUBERCLE OF CHOROID. A. CHOROID. B. PIGMENTED EPITHEL-



COMPLETE DESTRUCTION OF RETINA OVER HEALING TUBERCLE OF CHOROID. A. EDGE OF RETINA. B. TUBERCULOUS AREA IN CHOROID.



5. HEALED TUBERCLE SHOWING DESTRUCTION OF RETINA AND CHOROID. A. RETINA. B. CHOROID.

6. TUBERCLE OF THE RETINA.

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### CHANGES IN EYES OF RABBITS FOLLOWING INJECTION OF DEAD TUBERCLE BACILLI INTO COMMON CAROTID ARTERY.

WILLIAM C. FINNOFF, M. D.,

#### DENVER, COLORADO

Injection of dead tubercle bacilli produces ocular lesions similar to those due to living bacilli injected into the common carotid artery. However, the animals survive, so that the lesions run their complete cycle to resolution or scar formation. Of fifty-nine animals, forty-two developed ocular tuberculosis in from two days to nine weeks. Lesions were observed during life and examined histologically afterward in the iris, cornea, conjunctiva, lids, choroid, retina, vitreous and optic nerve. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, July, 1923.

After having thoroly studied the lesions that were produced following the injection of living tubercle bacilli into the common carotid artery of rabbits: a series of control experiments were undertaken to determine whether the lesions that were found, were characteristic of those produced by the organisms alone, or whether other substances used in exactly the same manner, were capable of producing similar changes. We have just finished the first of the series of experiments in which dead tubercle bacilli were used. At the present time, we are studying the changes that occur in the eye after using the various chemical extracts that are found in the tubercle bacillus. The latter experiments will be reported some time in the future.

Dead tubercle bacilli are capable of producing lesions in the eyes of animals that are similar, clinically, to those that occur after the injection of living bacilli into the arterial circulation. The essential difference is in the progress of the lesion and the duration of the animal's life. The microscopic changes in the eye, that are found in

sections, also differ slightly.

Living bacilli produce severe and progressive lesions in the eye in addition to pulmonary tuberculosis, from which the animals die before the eye lesions have an opportunity to run their full course. With dead bacilli, ocular lesions develop, progress to a certain stage, remain for a variable period, and then gradually disappear, leaving scars in the structures which are involved.

In our experiments, clump emulsions of bovine bacilli, grown on glycerine agar, were used. The organ-isms were killed by boiling for one hour. The emulsion was injected into the common carotid artery on one side, under ether anesthesia. Most of the animals, in which dead bacilli were used, lived for at least six months after inoculation; and some were still living after a year and three months. death of the rabbit was invariaby due to some intercurrent disease. Fortytwo out of the fifty-nine animals used in the series, developed ocular tuberculosis. The remaining seventeen were negative, and were discarded nine weeks after inoculation.

With clumped emulsions of living bacilli, all of the forty-six animals that were used developed ocular tuberculosis, while only slightly over 70% of the animals into which dead bacilli were injected, developed eye lesions. It is rather surprising to find such a high percentage of positives with dead

bacilli.

The quantity of dead bacilli used varied from 0.2 to 10.0 mg., but the size of the dose had no influence on the nature of the lesions or the frequency of takes. There were positives with minute doses, as well as negatives with large doses. It is impossible to explain the reason for negative results when all animals were inoculated in the same manner.

The very early changes, those occurring before the fourth day, resembled the changes that occur when any irritant is injected into the common

TIME OF APPEARANCE OF FIRST EYE SYMPTOMS

| Day    | 12 | 3 | 4  | 15 | 16 | 7 | week | 12 | 3 | 4 | 15 | 16 | 17 | 8  | 9 | total | negative |
|--------|----|---|----|----|----|---|------|----|---|---|----|----|----|----|---|-------|----------|
| Number | 16 | 3 | 18 | 0  | 0  | 4 |      | 4  | 4 | 1 | 0  | 0  | 0  | 11 | 1 | 42    | 17       |

carotid artery; i. e., chemosis of the conjunctiva, haziness of the cornea, swelling of the iris with occasional hemorrhages into the iris stroma and anterior chamber, and some times, exudation into the anterior chamber. These symptoms occurred in about the same number of cases with both living and dead bacilli. Just as with living bacilli, contraction of the pupil on the side injected was one of the earliest manifestations. It was seen on the second day in practically all of the ani-Hemorrhages and exudates were seen in a few instances and had the same significance as in the cases in which living bacilli were used. (A. J. O. v. 7, p. 81, Feb., 1924)

Ridged iritis did not occur as frequently with dead bacilli as with living. It was seen on the fourth day in eight animals. In two of these, small nodular elevations were present under the brown iris stroma, at the time that the ridges appeared. ridges were exactly the same in appearance in the beginning of the process as they were in the series injected with living bacilli, but instead of progressing as they did in the former, the swollen iris gradually returned to its normal thickness or became atrophic.

Pupillary exudates and posterior syn. echiae were common, and in many instances, they were permanent.

The grayish yellow, round and oval nodules, which occurred in the iris with living organisms, developed in the same manner after using dead bacilli. They were usually covered with blood vessels in the early stage, but after five or six weeks, the vessels became smaller and ultimately disappeared entirely. At the time that they began to disappear, the iris nodules changed in color. They became white instead of yellow, and frequently the contents of the tubercle broke thru into the anterior chamber. The smaller nodules were occasionally absorbed after six weeks; and left grayish, slate color patches of atrophy in the iris. (Fig. 1.) This was due to destruction of iris stroma. In three animals, a mild diffuse iritis occurred shortly after the inoculation. This rapidly subsided, and no other changes were found in the eye.

In some animals, the iris nodules were very large, and yellowish or white caseous material was present in them five or six months after the onset of the disease. In one, the whole iris was involved, and the anterior chamber

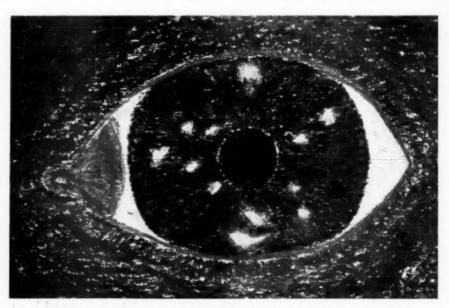


Fig. 1.-Slate colored patches of atrophy of the iris, following tuberculous nodules.

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was filled with a gummatous like mass. The eyeball was undergoing atrophic changes six months after inoculation. In three animals, a whole quadrant of the iris became thinned and atrophic, following the absorption of large tubercles. Iris nodules came in contact with the cornea in several eyes, and opacification of the latter invariably occurred in the region of the iris nodule.

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In all excepting one of the rabbits, the iris lesions were confined to the inoculated side. We were surprised to find changes in both eyes of this animal, because it was the first time that this had occurred in a series of over a



Fig. 2.—Massive, conglomerlate tubercle, almost fill-ing the anterior chamber.

hundred rabbits that had been inoculated with either living or dead bacilli. The eye on the side opposite to the carotid artery, into which the organisms were injected, was not as severely attacked as its fellow. In the eye corresponding to the side of injection, a massive conglomerate tubercle developed. It almost entirely filled the anterior chamber. (Fig. 2) In the opposite eye, the iris nodules were of the miliary type, and choroidal tubercles were present. The anterior chamber of the severely attacked eye was still filled with tuberculous material five months after the onset of symptoms, while the lesions in the other eye had become atrophic. Unfortunately, this rabbit developed a severe diarrhea, and it was necessary to kill it to save the eyes for microscopic examination.

#### IRIS LESIONS.

The onset, subsequent course and characteristic symptoms of iris lesions due to dead tubercle bacilli may be summarized as follows:

1. Contraction of the pupil. This is an early, nonspecific change occurring before the third day.

This is first seen 2. Diffuse iritis. on the second or third day and is the mildest form. It resembles the diffuse iritis that is seen in the human eye. The symptoms gradually subside. Occasionally, thin exudates and posterior synechiae occur at the pupillary mar-

Ridged iritis. This occurs on or shortly after the fourth day. It is characterized by irregular, radiating thickenings of the iris stroma without This gradually subsides, caseation. and the iris resumes its former appearance. Occasionally exudation, which either absorbs or becomes organized, is present in the pupil. This is first seen soon after the onset of the ridged iritis.

Tuberculous nodules. These may be associated with ridged iritis or be independent of it. They are usually multiple. They vary in size from a millet seed to large conglomerate masses which entirely fill the anterior chamber. They make their appearance between the fourth and fourteenth day, and are first seen as brown circumscribed elevations which push the iris stroma forward. These enlarge rapidly and soon become yellow in color. As a rule, the blood vessels appear on the surface of the nodules early.

Occasionally, the nodules fuse and produce massive conglomerate tubercles. The nodules in most of the cases, reach their maximum size in three weeks, and then gradually lose the yellow color and become white. As the nodules fade in color, the blood vessels diminish in number or entirely disappear. In some cases, the wall of the tubercle ruptures, and its content discharges into the anterior chamber and is soon absorbed. The nodules are generally located in the base of the iris above and below, but they occur

in all parts.

This follows all types Atrophy. of iritis but is most common after the nodular form. It does not occur as a rule until after the third week. In mild cases of diffuse or ridged iritis, small, oval or round, gray or slate colored patches, about the size of an ordinary pinhead, are seen thru the atrophied iris stroma. (Fig. 1.) The scar in the iris, following the nodular form of iritis, is usually slightly smaller than the nodule. A frayed atrophic pupillary margin of the iris with posterior synechia, may follow the ridged form of iritis.

### THE CORNEA.

The changes in this structure could be divided into early and late types. The early ones were characterized by haziness or complete opacification of the cornea and vascularity. The late changes were of three varieties; i. e., deposits, infiltrates, and sclerosing keratitis. The deposits resembled cold mutton fat, and accumulated on the posterior surface of the cornea. The infiltrates were in the substantia propria, and blood vessels were not pres-Sclerosing keratitis involved the periphery of the cornea. In two of the animals, the earlier form occurred and was followed by the late type.

The earlier changes were seen in seven of the animals of the series. The first evidence of corneal involvement was a faint stippled haziness of the whole cornea. This appeared on the fourth day in every instance. Early iris changes were usually present also. The cornea rapidly became more opaque, and in two or three days, white. As soon as the opacity involved the entire structure, fine blood vessels appeared at the limbus in the whole circumference of the cornea. The vessels rapidly invaded the substantia propria, and in about ten days time. the entire cornea became vascular. This exactly resembled both the clinical and microscopic changes which occurred in the cornea of animals that had been inoculated with living tubercle bacilli.

This striking change was a reaction to severe irritation, also, and occurs following the injection of irritants other than the tubercle bacilli. The microscopic changes in this type are similar to those found in keratomalacia.

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The vascularity of the whole cornea usually persisted for five or six days in the milder cases, and then the vessels began to disappear slowly. The disappearance of the vessels in the cornea was interesting. It was first noticed by a diminution in the number of fine vessels toward the periphery, and the formation of a few large vascular trunks which ran from the limbus into the cornea for two or three millimeters, and there branched in an arborescent fashion toward the corneal The periphery of the cornea between the vascular trunks gradually became more transparent. The clearing process continued until all of the vessels finally disappeared, without leaving any trace of their former existence, or only leaving fine strands of scar tissue in the substantia propria.

The later types of corneal change were never observed when living tubercle bacilli were used. They made their appearance after the eighth week in the animals that had been inoculated with dead bacilli. Eight of the fortytwo animals that developed ocular tuberculosis, had late corneal manifestations. Four belonged to the group with infiltrates in the substantia propria and deposits on the posterior surface of the cornea. Two had sclerosing keratitis and two had mixed forms consisting of deposits on the posterior corneal surface, corneal infiltrates, and sclerosing keratitis.

Sclerosing changes in the cornea were the first to appear; they were seen in the eighth week in one animal and in the tenth, in the others. The sclerosis began at the limbus and gradually invaded the cornea. In one case, a white crescentic sclerosed area occupied about one fifth of the lower portion of the cornea. The sclerosing process was a very slow one.

Infiltrates in the cornea were lardaceous in appearance. They were fine nebulous opacities in the substantia propria and vessels were never seen running to them from the limbus. There was little or no circumcorneal congestion. They remained confined to the deeper corneal layers, were mul-

tiple, were usually near the center of the cornea and did not break down. The infiltrates were still present six months after the rabbits were inoculated.

The deposits on the posterior surface of the cornea were few in number. They resembled drops of cold mutton fat in color and appearance, and were usually near the center of the cornea. These were still present after the sixth month. The thirteenth week was the earliest time that deposits or infiltrates were seen. In one animal, they did not appear until the eighteenth week.

The late corneal manifestations in the rabbit resembled the changes in the human eye, that we classify as

tuberculous.

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### THE CONJUNCTIVA.

Moderate conjunctivitis occurred in ten animals, and a severe type was present in three. The onset and symptoms were similar to those that were seen when living bacilli were employed. However, in all excepting the three severe cases, the conjunctival congestion, secretion, etc., gradually subsided, and in a week or ten days after the onset of the inflammation, the conjunctiva had regained its normal appearance. In the three severe cases, the cornea became opaque. There was lid involvement and other changes. No ulcers of the bulbar conjunctiva were observed in the series of experiments with dead bacilli. In one eye, a typical phlyctenule appeared in the conjunctiva at the limbus, on the twenty-fifth day after the inoculation. It did not break down but disappeared in ten days.

#### THE LIDS.

Tubercles of the eyelids occurred in ten animals. In nine, the disease was confined to the lid margins, and in one, it began in the substance of the lid. In eight of the nine rabbits, the tubercle was single and confined to one lid. In one, both the upper and the lower lid were invaded by a large tuberculous ulcer. The affection began as a small nodules at the edge of the lid. These gradually increased in size, finally ruptured, and formed ulcers in the lid margin. In one case, a nodule was seen as early as the fourth day. Six appeared

on the seventh, one on the eleventh, and one on the twenty-fifth day. The ulcers, irregular in shape, had crater like edges, and a base that was filled with a dirty gray necrotic material, which rested on granulation tissue.

The time for healing of the ulcers varied: One healed in seven days, five in two weeks, and three in one month. The ulcers were filled in with scar tissue, which contracted and deformed the lids. Some lids were deeply notched at the site of the lesion. In three cases, entropion with trichiasis occurred. In two animals, the lid margins became adherent and the palpebral fissure was obliterated for about one half of its normal length. In one of the rabbits, the upper lid was involved above the tarsus. The tubercle appeared as a small nodule under the skin. It gradually enlarged and five months after its onset, a cold abcess, which was as large as a good sized filbert, formed under the skin of the upper lid. The animal was living seven months after the onset, and the abscess had not ruptured but was becoming smaller.

Episcleritis occurred once. It appeared on the seventh day and lasted ten days. It subsided gradually and left no scars.

### THE CHOROID.

The early changes in this structure were like those that occurred in the series in which living bacilli were used. They appeared late, and were never seen with the ophthalmoscope before the fourteenth day. In some of the animals, choroidal changes could not be detected until much later. Tubercles of the choroid which could be seen with the ophthalmoscope were present in nineteen animals. They began as faint round, or oval yellowish areas of infiltration in the choroid. (See A. J. O., Feb., 1924. Plate III.) In the beginning, the lesions were poorly defined. They were always multiple and scattered iregularly thruout the fundus. The tubercles gradually increased in size and became clearly circumscribed and there was no pigment present on their surface. (Fig. 3-A). They then gradually changed in color to a dirty yellow or gray.

About this time, which was invari-

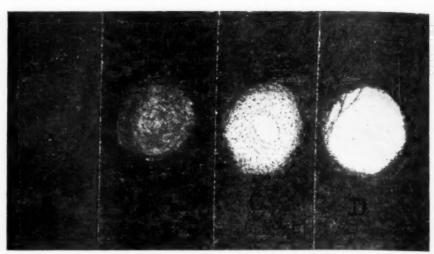


Fig. 3.-Successive stages of choroidal tubercle. See text.

ably between the sixth and ninth week after inoculation, pigment granules began to migrate to the surface of the lesion and gave the tubercle a stippled appearance. (Fig. 3-B). At this stage, some of the lesions had a beautiful, brilliant, metallic luster. The changes progressed slowly. Some of the areas retained a yellowish tint until the stage of atrophy was reached, when the centers of the lesions became white

and were bordered with pigment. (Fig. 3-D). Others turned from yellow to gray with pigment scattered irregularly thru the infiltrated choroid.

The small round area in the center of the gray mass gradually turned white, and was seen as a brilliant area in the center of the gray mass. The pigment disappeared from the center of the lesion and migrated to the edge of the brilliant, white, cen-

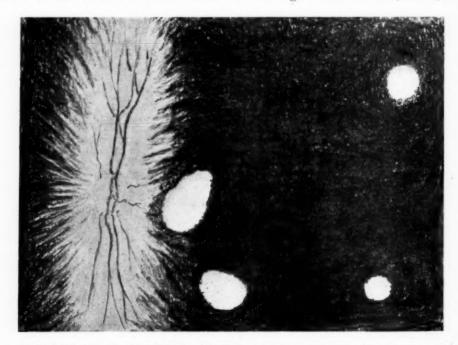


Fig. 4.—Scars left by tubercle of the choroid, right; and left, opaque nerve fibers normal in eye of rabbit.

tral core and was seen as a narrow band of banked up pigment. This pigment ring, in turn, was circled by the original grayish infiltrate, which contained pigment granules. (Fig. 3-C). At this stage, the lesions had a distinctly elevated appearance.

Next, the central core increased in diameter and became flatter. The pigment also migrated slowly toward the periphery of the infiltrated area and finally the whole lesion was replaced

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ay im ed nsequence of events in the choroid elsewhere and will not dwell on them here. The later changes, that were seen in sections prepared for microscopic study, showed that the stage of advanced caseation corresponded to the brilliant white areas that were seen with the ophthalmoscope. (Fig. 3-C). The microscopic picture of these lesions was a caseous area in the choroid, which usually involved all of the layers and in which there were no blood ves-

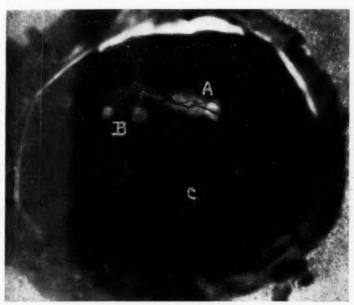


Fig. 5.—Photograph of posterior segment of eye. A, Normal nerve head of rabbit's eye. B, Scars of tuberculous lesions of retina and choroid. C, Postmortem detachment of retina.

by a white scar, which, ophthalmoscopically, seemed distinctly excavated. Pigment bordered the edge of the scar. (Fig. 4 and 5). Only an occasional choroidal vessel in the base of the lesions escaped invasion and destruction, and could be seen on the white sclera at the edge of the lesion. (Fig. 3-D). Patches that were entirely atrophic, were not seen until after the twelfth week. The average time for a choroidal lesion to run its full course was fifteen weeks.

With dead bacilli, none of the animals died from the effects of the injection before the lesions had healed; and several were still living a year and three months after the inoculation. This contrasts strikingly with our experience with living bacilli.

I have described the early histologic

sels, or other recognizable choroidal The pigment epithelium on the inner surface had degenerated and disappeared in and from the center and was piled up over the edge of the mass. The retina in front of the tubercle showed varying stages of degeneration and disintegration. The whole lesion was slightly elevated at this stage. Later the pigment epithelium disappeared from over the surface of the greater part of the tubercle, and the caseous mass had become partially absorbed. It was bordered by epithelioid cells, giant cells, small round cells, and fibroblasts. In the terminal stage, the whole choroid and retina were destroyed and were replaced by scar tissue. The edge of the lesions were surrounded with degenerated or newly

proliferated pigmented epithelial cells. This was the histologic section of the terminal stage of the choroidal lesion. (Fig. 4).

#### OTHER STRUCTURES.

In two animals, detachment of the retina over choroidal lesions occurred. In one, the detachment progressed until it finally became complete. A secondary cataract followed the detachment.

Haziness of the vitreous from serous

details were obscured by an exudate in the pupil. A tubercle was discovered in one on the surface of the optic nerve in microscopic sections. A typical tubercle with a caseous center, which was surrounded by epithelioid cells, giant cells and small round cells, was present in the other. (Fig. 6). The retina was partially detached by a serous exudate.

Tuberculosis of the retinal vessels

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Fig. 6.—Tubercle of optic nervehead. A, Caseated area in center of tubercle. B, Central retinal artery.

and cellular exudates was seen occasionally. It only occurred in eight cases, but cleared in a short time and was not as severe in any of the animals as it was in the former series.

Tuberculosis of the optic nerve was seen with the ophthalmoscope in one animal. The tubercle was first detected on the twefth day as a small elevation at the upper margin of the disc. This gradually increased in size, until it had grown forward into the vitreous for several millimeters. Fine vessels grew over the surface of the mass, and those on top could be seen with a +12. diopter lens. The animal died from diarrhea six months after the inoculation, and was unfortunately destroyed by an attendant before the specimen could be obtained.

In two other animals, the fundus

did not occur in the series in which dead bacilli were used, but in one section, an isolated tubercle was discovered on the surface of the retina.

One animal had a severe generalized uveitis associated with keratitis and conjunctivitis. The globe ruptured four weeks after inoculation and was converted into a granulomatous mass.

In two of the animals, with massive conglomerate tubercles of the iris which filled the anterior chamber, the globe was becoming phthisical five months after infection.

I am indebted to Lt. Donald H. O'Rourke (M. C. U. S. N.) for valuable assistance in carrying out these experiments and to Dr. H. J. Corper, director of the Research Department of the National Jewish Hospital for Consumptives, where this work was done.

# NOTES, CASES, INSTRUMENTS

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F. H. VERHOEFF, M.D.

BOSTON.

(1) This method has the advantage of supplying a conjunctival covering for the iris, obviously superior to the conjunctival flap usually employed.

By means of scissors, which should be small, sharp and dull pointed, a small hole is made in the conjunctiva about 5 mm. above the corneal limbus. Thru this hole the conjunctiva, with the episclera, is undermined down to the limbus. It would make a still neater operation if this step could be omitted. Once or twice I tried to omit it, but was then unable to introduce the iris forceps into the anterior chamber.

The edge of the hole is grasped with forceps and the conjunctiva elevated. A Ziegler knife needle is inserted thru the hole, and passed subconjunctivally thru the corneal limbus into the anterior chamber. By a sawing motion an incision about 4 mm. long is made along the limbus. With a sharp knife this is easily and quickly done, before the anterior chamber is evacuated. Iris forceps are now introduced and the iris drawn out beneath the conjunctiva in the usual manner. No conjunctival suture is requiredthe conjunctival wound is almost invisible the next day.

Owing to danger of injuring the lens, this method, of course, cannot safely be employed in cases of chronic glaucoma in which the anterior chamber is very shallow, but such cases are exceptional.

I have found iridotasis superior to the trephine operation in cases of chronic congestive glaucoma; because in such cases a trephine opening is especially apt to become closed by the tissue reaction.

In cases in which iridectomy has failed to reduce the intraocular pressure sufficiently, I have found the following modification of iridotasis valuable. In fact, with this operation to fall back upon, I am now more apt to try iridectomy as a primary procedure in a case of chronic glaucoma.

The incision is made as just described, except that it is placed a little to one side of the coloboma. The iris is then grasped, not at the pupillary margin, but at the middle of the nearest edge of the coloboma. In withdrawing the iris thru the incision, it is everted just as in the case of an ordinary iridotasis, but, if possible, the sphincter is not drawn out. In case the iris is rigid and offers great resistance, it is wedged in one angle of the wound to prevent it from retracting into the anterior chamber when released.

# GLAUCOMATOUS EYE WITH CLOUDED CORNEA BUT DEEP CHAMBER.

E. V. L. BROWN, M.D.

CHICAGO.

A. S., No. 12227, a gentleman of sixty-two, presented himself at the University of Illinois, April 28, 1922, with the complaint of failure of vision in the left eye of six weeks' duration. Examination showed a hazy cornea in the presence of a deep anterior chamber. In addition the lens nucleus was a bit cloudy, the pupil fixed and slightly dilated, the disc glaucomatously cupped 4 D., Schiötz R. 23, L. 82, the form field gone except up and out and the red field decreased to an eccentric 2°x5° central oval; RV 0.8, LV 0.3. Eserin 2% q.i.d. thruout the next ten days did not narrow the pupil to less than 4.5 mm. or reduce the tension below 62. A trephining was agreed to but the patient caught a cold and the operation was deferred. In the fourth week Professor E. Fuchs saw the patient in consultation and was much interested in the contradictory findings, the cloudy cornea speaking for the secondary nature of the increased tension and the deep chamber for a primary glaucoma. When told that a trephining was contemplated he advised against it because "in the presence of something which is not understood one should do the simplest thing possible." He, therefore, recommended a paracentesis. This was carried out and solved the riddle. The

cornea cleared at once and three days later one could see innumerable, very fine, discrete grey-white precipitates over the back of a third of the cornea. Tension dropped to twenty-one and vision improved to 0.6 but on the 4th, 5th and 6th days the tension increased to 31, 38 and 44, respectively. The cornea again became grey, the precipi-

producing such a disturbance (or a similar one) has continued at work is indicated by the appearance of fine vitreous floaters in the operated eye a month after the iridectomy and in the unoperated eye five months after that. No glaucomatous symptoms have ever appeared in the other eye and there are no paracentral scotomata.

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Fig. 1.-Rupture of choroid, three days after injury. Williams' case.

tates fewer, the pupil again wide. On the seventh day more precipitates could be found and Professor Fuchs advised an iridectomy. Ten days after the paracentesis the tension had risen further to sixty four and a 7 mm. wide strip of the upper iris was excised by Dr. W. F. Moncrieff. The cornea again cleared, the tension returned to normal, along with good vision (0.6 to 0.8), and has remained so these twenty-three months.

Search for a cause of the cyclitis has not been productive of any conclusive result but that some factor capable of Aside from the interesting conflict between the clouded cornea and deep chamber, the case presented one other instructive feature, namely, the development of a large subconjunctival bleb in the previously flat conjunctiva over the iridectomy scar. It first appeared some ten months after the operation, and was about the size of a split pea, never showed fenestra by fluorescein and has gradually become less prominent, altho I still consider it a source of great danger to the eye. The phenomenon supports the view of Colonel Herbert that many (he says all)

iridectomies which work do so because of filtration of aqueous thru the operation wound tract.

# RUPTURE OF CHOROID.

CHARLES B. WILLIAMS, M. D.

MINERAL WELLS, TEXAS.

I report this case because of the apparently simple nature of the injury,

according to his statement, began to pain considerably. I was called to see him on third day after injury and because of his anxiety about the eye at that time, I examined the fundus before giving a prognosis. Fig. 1 shows condition of the fundus three days after injury with four visible choroidal ruptures. Fig. 2 represents the condition three months later. After absorption of the hemorhages a fifth rent was



Fig. 2.—Rupture of choroid, three months after injury. Hemorrhage absorbed, showing fifth rupture.

so far as the eye was concerned, and the disastrous results to vision which followed.

Report of case.

Mr. V. D. M., age 35, while splitting kindling wood was struck over right eye by flying stick. The main force of the blow seemed to have been spent on bridge of nose and right malar bone, there being no abrasion except at these points. The patient felt but little inconvenience for two days after the accident at which time the eye, which had been only moderately red

exposed. Atrophy of the nerve was well advanced at this time. Six months before the accident the eye had vision of 20/20+. Three months after the injury it could only see the outline of the chart at 20 feet.

## TWINS WITH HIGH HYPEROPIA.

MELVILLE BLACK, M.D. DENVER, COLORADO.

Two sisters, aged twenty-eight, who look almost exactly alike, came to me

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split oresless it a The Colall) to be refracted. They each gave the same history of convergent concomitant squint of childhood. At about the age of eighteen they were first refracted and given glasses. The squint disappeared. Each has an amblyopic eye, only it is the right eye of one girl and the left of her sister. In each however, it is the eye with the higher ametropia. The refraction is that of high hyperopia with astigmatism and is very similar in each twin.

Hattie A.

O.D. V. 20/30 w. +6.00  $\bigcirc$  - 1.00 Ax. 180°.

O.S. V. 20/70 w. +7.00 \_ - 1.00 Ax. 15°.

Maddox rod shows 1° Esoph, at 20 feet

Effie A.

O.D. V. 20/50 w. +7.00  $\bigcirc$  -1.00 Ax.

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O.S. V. 20/20 w. +6.50  $\bigcirc -1.00$  Ax.  $180^{\circ}$ .

Maddox rod shows orthophoria at 20 feet.

The great physical resemblance of these girls has been further carried out in the refractive error of their eyes, so that it may be said they have twin eyes. If they changed glasses by mistake it is doubtful if they would at once be aware of it. It has never been my experience to see twins with such a complementary error of refraction. Upon inquiry among a few confreres I find their experience coincides with mine. It is because of this that I place these cases on record.

# SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly scientific papers and discussions, include date of the meeting and should be signed by the Reporter or Secretary. Complete papers should not be included in such reports; but should be promptly sent to the Editor, as read before the Society.

# ROYAL SOCIETY OF MEDICINE (LONDON).

Section of Ophthalmology. January 11th, 1924.

MR. A. L. WHITEHEAD, President.

# Late Sympathetic Ophthalmia After Trephining.

Col. H. Herbert, I. M. S. (Retired) read a contribution on this subject. He said the disease followed a trephining operation, performed without iridectomy, for congestive glaucoma, in November, 1917. More than five years elapsed before the other eye became involved. At the time of the operation, the patient, a woman, was aged 62. The operation did not entirely relieve the tension, and the congestion persisted for more than a month. After that, it gave no more trouble until the fellow eye was attacked, and then injection and tenderness returned. In the sympathizing eye and disease was comparatively mild, and seemed to yield completely to three months of simple mercurial treatment.

In this case there was ample histo-

logic evidence that the operated eye, during the five quiet years, was only relatively quiet. The notes mentioned only a dense white pupillary opacity, and the fact that the eye was blind. There was good reason for believing the eye was the seat of a very feebly progressive infective process thruout.

The nodular character of the uveitis was very noticeable, the foci of greatest infiltration standing out as round white points in the iris, ciliary body and choroid. He described the cytology by the help of a number of slides.

As a probable indication that the unknown specific organism had become acclimatized outside the uvea, large cell infiltration could be followed thru the tissues filling the trephine hole, and thru the sclera, along the anterior perforating blood vessels above and below the cornea. It had spread into the conjunctiva, and backwards immediately superficial to the sclera. There was another extrauveal site of activity beneath the thick pupillary membrane, noticed clinically between the membrane and a thick capsular cataract. The detached retina

was folded and thickened, and the ciliary body and choroid were more or less detached from the sclera, and their layers were widely separated. The inner surface of the choroid below merged into a thick layer of new fibrous tissue, containing masses of pigment granules, derived possibly from the retinal pigment layer; pigment had also wandered into the detached retina.

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With regard to the bearing of the case on the operative treatment of glaucoma, he had not heard of any instance of the disease following an intentional iris-inclusion operation for over twenty years, and he believed a correctly performed iris-inclusion operation was quite free from this risk; but he held that correct performance included effective conjunctival antisepsis. In the present case the trouble was probably due to the lack of this.

Discussion. THE PRESIDENT said he thought most members would disagree with the statement that in most cases of this operation there was some incarceration of the iris.

Mr. Pickard said he had had two or three cases of chronic glaucoma affecting both eyes, in which suddenly, for no obvious reason, one eye developed a condition with severe iridocyclitis leading to blindness, and its clinical appearance would be taken for that of sympathetic ophthalmia. some cases of chronic glaucoma he thought the glaucoma was the expression of some very mild cyclitis, without the ordinary symptoms of iridocyclitis. He had notes of cases with clinical symptoms of sympathetic ophthalmia tho there had been no operation on the other eye.

SIR WILLIAM LISTER remarked that the question of the incarceration of iris in the trephine operation, struck hard at the basis of technic. It was very important to avoid any iris incarceration whatever. Cases of late infection he considered to have been associated with the entanglement of some iris in the wound. Directly the knuckle of iris appeared thru the trephine hole, it was very important to take hold of the posterior portion of the knuckle and pull it up, pulling out suffi-

cient iris so that when the cut was made the iris spread away from the opening. Where the pupil was large, the operator should aim at doing a complete iridectomy, right thru to the pupillary margin, so as to avoid incarceration.

MR. E. TREACHER COLLINS suggested that unless Col. Herbert made serial sections thru the complete trephine hole, he could not be sure there was no entanglement of iris in this case. In this case it was open to question whether it was not a late infection. In one of the sections shown there was infiltration of the conjunctiva around the trephine hole, and that might have been the source of infection.

MR. R. Affleck Greeves suggested that one of the most important things in trephining was to split the cornea forwards; sometimes the trephine was put too far back, and then incarceration of iris was likely to take place. He had cut sections of a series of eyes which were trephine failures, and in each case the failure was due to incarceration of the iris, caused by the trephine having been put too far back.

MR. LINDSAY REA related a case in which he had to trephine two eyes in an urgent case of glaucoma, and the iris in one was incarcerated round the edge of the trephine hole, and he was unable to free it. As soon as he replaced the flap, he instilled atropin into the eye, and kept it under its influence with the result that in less than a fortnight the iris pulled well away from the trephine hole, and the eye did well, vision being restored to 6/9 partly.

THE PRESIDENT agreed with Sir William Lister as to the the importance of securing freedom of the iris from the wound; he would do a complete iridectomy rather than leave any trace of iris in the trephine opening.

Col. Herbert replied on the discussion. He agreed it might not be quite fair to say the average trephine hole contained some iris, and in that respect he might have too readily accepted Elliot's statement. Probably the slight iris incarceration in this case had something to do with the disease. He did not doubt in his own mind that it was

sympathetic ophthalmia, and the histology he regarded as characteristic, as revealed by the slides he had shown. In answer to Mr. Collins the tissue on either side of the trephine hole was serially examined. The infiltration of the conjunctiva was exactly like that of the uvea.

# The Practical Value of the Slit-Lamp.

Mr. T. Harrison Butler read a paper on this subject, and gave a demonstration of the lamp. His paper was illustrated by a series of epidiascopic

representations.

He said many still had the idea that the slit-lamp was useful mainly for research, that its function was chiefly anatomic. Alvar Gullstrand had opened up an epoch in the specialty comparable to that produced by discovery of the ophthalmoscope. Probably as much had been learned from a study of the fundus and media as was possible by present methods; but the slit-lamp enabled the problems to be attacked afresh, not only by supplying a vastly increased magnification, but by permitting the illumination of structures from behind, and above all, enabling the anatomy of the eye to be seen Slit-lamp technic in optical section. could be to some extent applied to ordinary oblique illumination with condensing lamp and loupe, and when the observer became accustomed to the aspect of the cornea, iris and lens under high magnification, he was the better able to interpret the same subject seen with the smaller magnification of the loupe. By means of a 40candle, half-watt gas-filled lamp, a ray of light could be made to pass into the eye, and the cornea could be seen to be illuminated, the anterior chamber dark, and, in cases of lens sclerosis, that there were dissociation areas in the lens. If the patient fixed his gaze properly the lens shagreen and the sutures of the senile nucleus could be seen, also the position of opacities in and under the capsule. By lens light one could see holes and atrophic areas in the iris collarette. With this lamp he had seen the circulation in the vessels at the limbus of a normal eye; the light was reflected from the sclera, and

traversed the vessel, thus fulfilling the conditions necessary to see the circulation.

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He did not claim to possess expert knowledge of the slit-lamp, tho he had taken Professor Vogt's course at Zürich, and had been working with one in Coventry Hospital for four months. During that time he had learned more about the anatomy and pathology of the anterior segment of the eye than with the older methods he had obtained in four years. It was essential to have the correct instrument, namely, the combined slit-lamp and Gullstrand simplified ophthalmoscope. He described the details of the instrument, and the functions of the various parts.

The examination must be made in complete darkness; the more difficult objects would be seen only when the eye was dark adapted. It was very important that the microscope should be carefully adjusted for interpupillary distance, as the slightest error in this respect disturbed the stereoscopic effect, and caused eyestrain. Little or no discomfort to the patient was occasioned by the examination, but cases of interstitial keratitis were unsuitable in this respect.

Instruction in the use of this lamp was quite as necessary as in the use of the ophthalmoscope; practice should commence on pigs' eyes, and be continued on the normal human eye. Koeppe's valuable work on "Microscopy of the Living Eye" was an absolutely necessary work to be studied from the microscopic side of the ques-

tion.

Mr. Butler emphasized the fact that the slit-lamp does not supersede present methods, but rather amplified and supplemented them. It enabled much which formerly was problematic to be clear. When the ribbon of light was focussed on the cornea, the illuminated part of the structure could be regarded as a prismatic block of light, and this enabled the observer to know, with reasonable accuracy, whether an object or structure was on the corneal surface, within the corneal tissue, or on the endothelial surface. By narrowing down the slit, one could more or less abolish the corneal and endothelial surfaces, and obtain a pure section. He exhibited slides showing the effect produced by a corneal ulcer, and how fluorescin penetrated deeply into the stroma. A conical cornea gave a prism whose anterior surface was more strongly curved than the posterior.

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He had found the slit-lamp of service in the case of foreign bodies embedded deeply in the cornea; with the knowledge so obtained one could plan the method of extraction, and do the extraction with the least damage to the cornea. But it was in inflammatory conditions of the eye that the examination of the cornea was of special value. The endothelium of the peripheral areas of the cornea gave the appearance of being covered with small drops, like the mirror in a hot bath-room, a process Vogt called "bedewing"; that authority believed it to be due to a change in the endothelial cells. Koeppe, however, considered that it was caused by a cellular deposit. A case of interstitial keratitis could not be completely interpreted without the slit-lamp; with it, the extent and position of the vascularisation could be mapped out. Symmetric radial folds in Descemet's membrane and Bowman's membrane, had a diagnostic value in the case of a boy with iridocyclitis, figures of which were shown.

Observation of the aqueous was very difficult, and called for complete dark adaptation. In a recent case of iritis he noticed that the aqueous was relucent. Careful study revealed flocculent gelatinous masses, and the presence of these was generally supposed to denote a gonococcal origin. The presence of cells in the aqueous was the first sign of iridocyclitis, and was especially valuable in the case of a sympathizing eye. The presence of these cells could be held to be an early warning of sympathetic ophthalmitis.

The microscopy of the iris gave merely an enlargement of what was seen with the loupe.

The slit-lamp was of most value in connection with the lens. The optical section given by a narrow ribbon of light enabled the lens to be seen in profile, exactly as though it had been cut with a knife. Vogt differentiated

the following regions: the capsule, the cortex, the senile nucleus, and the embryonic nucleus. There was a dark layer immediately under the capsule, whose significance had not yet been explained. Clinically, the lens could be regarded as three lenses, one within the other, and these gave mirror effects to focal illumination. The recognition of these facts greatly enhanced the powers previously possessed of diagnosis and prognosis, and also had a definite influence on treatment. noted in a case of diabetic cataract that the lens capsule was greatly thickened; and in such a case, if he had to operate, he would use the capsule forceps in preference to the capsulotome. Barraquer made a careful slit-lamp examination of every lens before using his suction apparatus on it; by this means he could form an opinion of the conditions he would meet.

Mr. Butler showed four figures illustrating a case of combined cortical cataract and nuclear sclerosis. Examination of the lens in mirror light showed that the whole surface was covered with nipple-like eminences, apparently on the same level as the shagreen. In section this was seen not to be the case; the elevations were on the surface of the senile nucleus. This was seen to be highly sclerosed, and very yellow. The contour of the nucleus was much more curved than that of the lens itself. When the internal lens became sclerosed and more highly refractive than the cortex, the stronger curvature came into play and caused lenticular myopia, which, in this case, was 5 D.

One of the chief uses of the slitlamp was the power it conferred of recognizing slight signs of cyclitis. He carefully investigated every case of cataract, so that if the case should subsequently come to extraction, he had knowledge of the nature of the change in the lens.

So far, he had not found much help from the lamp in the examination of the vitreous. It called for Koeppe's mirror and Vogt's micro-arc lamp. The chief drawback in regard to the use of this instrument was the extra time required in the examination of cases, in his own clinic it was an additional 50%. But the extra time was well spent, as it added enormously to the interest and accuracy of eye work. The method was sufficiently specialized to warrant the formation of a small society of enthusiasts to compare notes and instruct and be mutually helpful.

Discussion. Mr. Basil Graves said that some time ago he heard Mr. Treacher Collins express the view that it was likely the slit-lamp was destined to have on ophthalmology an influence, in all probability, comparable to that for which many years ago the introduction of the ophthalmoscope was responsible. The slit-lamp and binocular microscope were of the greatest service in daily routine clinical work; they examined a case with greater ease and confidence, and with the expenditure of less time and energy, for the every-day pathologic features for which it might be customary to search more laboriously by means of the monocular loupe with ordinary illumination. Certain important clinical features could only be seen or located by this new apparatus. Dr. Vogt's statement that the facility afforded by the slit-lamp enabled recognition of the prodromal manifestations of sympathising ophthalmitis at a far earlier stage than heretofore, was alone a justification for possessing the instrument.

With regard to its use in training students in ophthalmology, its use in detecting and recognizing many features gave ample scope in training accurate observation and scientific deduction.

In reference to the clinical aspect, Mr. Graves said that in the present stage of development the method of pursuing work of this nature fell under three main readings. Firstly, a general slit-lamp examination of any patient whose eyes were normal, or of other patients irrespective of the eye condition from which they were known to be suffering. In examining any old woman's eyes with binocular microscope and slit-lamp one had a museum before him. As Lang Clinical Research Scholar at Moorfields Hospital and as British Medical As-

sociation Science Research Scholar, he had been doing clinical investigation with the slit-lamp for some time, yet in examining at the Royal Westminster Eye Hospital only last week five patients referred to him by the Staff, he was able to derive some ten or twelve facts, or comments on facts worth noting for future slit-lamp reports.

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After the study of unselected patients, a second line of investigation with the slit-lamp consisted in the study of special and selected cases known to be suffering from some regional affection, and for those who had access to a large clinic, this method was very profitable of results.

was very profitable of results. A third line of investigation—one which would yield comparatively few results-consisted in the study over a long period of one individual patient, known to be suffering from some given alterable condition; and the recording of the features seen with such accuracy that it was possible precisely to define, at each succeeding examination, the changes, often minute, which might have occurred since the previous examination of that patient. This last method called for laboriously accurate, oft repeated records, and they required much time, hence it was not a method to be advocated for those who had a large number of cases to select from. In the large clinics of London and the provincial towns there must be a large and wonderful field slit-lamp research, and there seemed to be scope for an organized combined research in the eye clinics here. And for this, he thought recourse might be had to the team system of investigation, in which the majority of the members of any one team might be postgraduate students who were anxious to gain experience in the use of the apparatus.

An important subject was that of illustrating for publication; every day he felt the material was there if only he had the ability to record it pictorially. He had been much interested in Mr. Rayner Batten's remarks, published in the "Transactions of the Ophthalmological Society of the United Kingdom," 1923, on the training

of draughtsmen for fundus drawing. Many of those remarks would apply also to slit-lamp pictures, but Mr. Graves thought the training of artists for the latter might take much longer. He had himself tried training two persons, one an artist and one a professional draughtsman, and he had abandoned the attempt, because he had come to the conclusion that it would have taken him a year or possibly two to train either of those persons to see the technical features in quite the same perspective that he saw them himself. He had, instead, decided to paint the pictures as best he could, in the hope of getting pictures which, if not artistic, might at least be technically accurate, and he hoped to supplement his capacity by having elementary lessons in painting. For publishing, he would endeavor to get an artist who would reproduce suitable pictures from his less artistic efforts.

The answer to the criticism that the use of the binocular microscope and slit-lamp took much learning was, that it depended on the aim of its possessor, and that the detecting of many of the most important clinical features, early diagnostic of disease, soon became self-evident to the possessor and user of his own apparatus. Teaching of the subject took much time, and was somewhat arduous. If it were to be done on a large scale, it would need

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Mr. Graves concluded by urging certain precautions in regard to this work. There were occasional indications for some degree of restraint or conservatism with regard to the attitude taken towards certain issues of the subject.

First, tho no limit was set by convention to the degree of magnification necessary before the use of the term "microscopy" was justified, he did not feel sure that the choice of this term for the work had been altogether a fortunate one, because it, and perhaps a natural enthusiasm for a new subject, might account for the somewhat liberal assertions occasionally made as to the possibilities of this work. The subject of the optical section was an anatomic, not a histologic one; the latter term was only

applicable to the corneal endothelium by the method of specular reflection. He said that not long ago he read an article in which the writer seemed prone to refer to every white speck seen floating in a pathologic aqueous as an individual cell, if not as a leucocyte, and to every pigment speck as a pigmented epithelial cell. In one or two cases in which there was indication to open the anterior chamber, Mr. Graves said he had drawn off and examined the aqueous containing these granules, and he would suggest that one should not be tempted, on insufficient evidence, and without careful consideration, too readily to pin histologic nomenclature to these new manifestations.

His second precaution was to urge that enthusiastics for the work, while allotting to it its due share of importance, should be careful that it preserved its proper place and its pro-portional share in the general scheme of the routine clinical examination. It was not good practice to subject a patient to slit-lamp examination to the exclusion of other and preceding methods of examination. In one article on the slit-lamp he read a statement to the following effect: "Now that we have the slit-lamp we are frequently able to explain, in a manner that we could not do before, why a given patient in whom, by means of ordinary appliances, we see no reason why he should not be able to read as far as 6/5 or 6/4 can read only to 6/9

or 6/6."

Mr. Graves suggested that if the ophthalmologist was clinically well trained and was competent with the ordinary appliances, he was able, by using such instruments as a small electric ophthalmoscope, to detect the presence of minute imperfections in the media which were causing obstruction to vision; say, in the cornea, lens, or vitreous. No lens should be studied by means of the slit-lamp unless it had first been scrutinized by close, direct method ophthalmoscopic examination. If the observer depended only on the slit-lamp examination not only might he fail, tho expert with the slit-lamp, to detect some important

changes, but his conception of the significance of these changes, from the important point of view of their immediate effect on vision, might be erroneous.

In summarizing the value of the slitlamp in routine work, Mr. Graves said that in conjunction with the binocular microscope it afforded means, with an ease and precision hitherto unapproached, of detecting and locating and explaining clinical pathologic changes, some of which were detectable by no other means, many of which were of the greatest diagnostic importance, and all of which were interesting.

He then, by means of the epidia-scope, showed illustrations including distortion of the beam owing to alteration of contour near the limbus, in the case of a man who was suffering from paresis of the external rectus following a blow from a stick; nerve fiber conditions; a variety of Hudson's brown line of the cornea, which had been described by Mr. A. C. Hudson in 1911 under the title "Certain Peculiar Pigmentary Markings in the Cornea," tho this feature was usually referred to as Stähli's. He also showed fine changes in the endothelium of the cornea in a diabetic patient; pathologic changes in the aqueous; newly formed vessels in the organized exudate about the pupil, due to iritis; changes early in tuberculous iritis; water fissure in the lens of a diabetic patient; changes in senility; injury and dislocation of lenses, and illustrations of vitreous conditions.

H. DICKINSON, REPORTER

# AUSTRALASIAN MEDICAL CONGRESS.

November 12-17, 1923.

The Australasian Medical Congress was held in the buildings of the University of Melbourne from November 12th to the 17th, 1923. The President of the Ophthalmological Section was Dr. Paton of Perth, who, in the course of a very interesting presidential address gave first hand practical information on the intramuscular use of milk in the treatment of trachoma. The proceedings of the Section included a discussion on the

treatment of trachoma, in which a number of members deprecated the excision of the tarsus on the ground that it does not prevent recurrences in many cases, and it renders subsequent treatment exceedingly difficult.

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Dr. Lockhart Gibson of Brisbane drew attention to the danger run by the assumption that a negative Wassermann reaction excludes syphilis, and illustrated his thesis.

Dr. Leonard Mitchell presented the result of a clinical study of 110 cases of renal disease and arteriosclerosis. The general opinion of members was that the socalled albuminuric retinitis was a symptom of extreme gravity when white effusion made its appearance, that hemorrhages were of very little serious significance, and that albuminuric retinitis without high blood pressure was uncommon.

An elaborate analysis from the hereditary point of view of perinuclear cataract was furnished by Dr. J. Kingland Anderson. The hereditary nature of the condition was made fairly obvious.

Sir James Barrett produced some cases of accidents at sea, which may have been caused by defective vision. They were cases notes of which were posted to the Sir Edward Nettleship from Australia, but reached London after his death, and are now placed on record. He also urged the appointment of schools for myopes and emphasized the importance of the work begun by Dr. Ernest Maddox of Bournemouth. As Oculist to the Royal Victorian Institute for the Blind, he furnished an analysis of all the cases which had entered that Institute for the last 20 years, and showed that at least half of the cases of blindness in children were due to venereal disease.

Dr. Newman dealt with the causation of myopia from the point of view of the failure of the membrane of Bruch, and Dr. Temple Smith gave an elaborate exposition of his method of rectifying strabismus.

The papers will appear in full in the Australian Medical Journal. An excellent clinical demonstration was given at the Eye and Ear Hospital, Melbourne, on the afternoon of Tuesday, November 13th.

# COLORADO OPHTHALMOLOGI-CAL SOCIETY.

December 15, 1923

DR. J. W. LEHAN, presiding.

Chronic Irritation After Penetrating Injury.

W. C. BANE, Denver, presented a man aged fifty-two years, whose left eye was said to have been injured twenty years previously by a piece of steel. The lens and part of the iris were missing, and the upper half of the iris was narrow and discolored. The injured eye had had attacks of inflammation on and off for the past two years. The vision of this eye was reduced to seeing a hand at eighteen inches. The upper half of the The tension was cornea was steamy. rather below than above normal. The vision of the other eye was normal. Enucleation would probably be necessary before long.

Exophthalmus.

W. C. BANE, Denver, presented a woman, aged seventy-five years, who had come on December 6th with a history of the right eye having started to bulge six weeks earlier. The bulging had increased for one week, the eyelids had become swollen and the eyeball red. The redness had soon disappeared. Five weeks after protrusion began, diplopia developed. The right eye protruded four mm. beyond the plane of the left. The vision was R. 5/7, L. 5/6. There was esophoria of twenty degrees. The fundi appeared The diplopia was increased healthy. upon turning the eyes to the right, it thus appearing that the function of the right internal rectus was impaired. The few remaining teeth were not very healthy. The urine contained a few granular casts and a trace of sugar. Wassermann test was negative, and there was no evidence by X-ray of disease in the surrounding bones or nasal sinuses. The patient had been given five grains of potassium iodid three times daily. December 27, Dr. Bane reported that exophoria was somewhat less marked, that the esophoria was only four degrees, and that the patient was less annoyed by diplopia.)

Discussion.—J. A. PATTERSON, Colorado Springs. There is more congestion

of the right disc than of the left. Either the teeth or the sinuses may be factors.

MELVILLE BLACK, Denver. This is a case for observation, and no definite conclusion can be reached at the present time. The teeth should be attended to.

Iris Cyst.

J. M. SHIELDS, Denver, presented a boy, aged eleven years, who had come on account of a dark mass at the upper margin of the left cornea. There was no history of injury to the eye, but about a year previously the boy had been given home care for about two weeks for an inflammatory condition of the left eye. The pupil was slightly pear shaped, the iris being drawn upward toward a small bean shaped mass which protruded at a little before twelve o'clock along the upper limbus. The mass was covered by glistening epithelium and was easily compressed with any small blunt instrument. few days after first coming to the clinic the boy had returned with a large erosion of the right cornea, which had quickly disappeared under atropin and neosilvol. The vision of each eye was 20/20.

Discussion.—F. R. Spencer, Boulder. It looks to me as the this boy must have had earlier in life a phlyctenule at the limbus followed by perforation of the cornea and cystic degeneration of incar-

cerated iris tissue.

Mellville Black, Denver. When I saw this case with Dr. Shields, it looked to me as the there must have been a perforation of the cornea. I cannot account for such perforation in any other way than that suggested by Dr. Spencer. It seems improbable that the boy could have have had this condition without its being discovered until the last few weeks.

W. H. Crisp, Denver. My impression is that the prolapse was more probably due to a forgotten small penetrating injury. The mass is easily transilluminated, so that it is not solid.

W. C. Finnoff, Denver, thought that the history of severe pink eye a year ago and the normal thinness of the cornea and iris were in favor of Dr. Spencer's explanation.

C. A. RINGLE, Greeley, thought that

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he xen ie, injury might be responsible for the mass, and referred to a case in which traumatism had produced cataract and also a cyst.

### Magnet Extraction.

J. A. McCaw, Denver, presented a machinist, aged twenty-three years, whose left eve had been penetrated by a splinter from a wrist pin which he was fitting in an automobile engine. The fragment had entered the eye one mm. above and one mm. to the temporal side of the center of the cornea, had passed obliquely across the lens capsule, and after lacerating the iris epithelium had punctured the iris about two or three mm. from the pupillary border. By skiagraphy it was localized three mm. behind the center of the cornea and two mm, external to the median line. With the corneal microscope one end of the foreign body had been seen in the iris puncture. Dr. Walker had extracted the foreign body thru the corneal wound with the giant magnet, two hours and a half after the injury

Discussion.—W. H. Crisp, Denver. These men will not wear protecting lenses, in spite of the wonderful results reported by large and well recognized industrial establishments from the systematic wearing of goggles.

D. H. COOVER, Denver. I examined this man for the insurance company. In spite of his statement that he could not see I was able to study the fundus perfectly. So I tested him for malingering, by using plus 16. D. sphere over the good eye and a minus 0.12 D. sphere over the injured eye. With this combination he read 20/40.

W. C. FINNOFF, Denver. While I was in London, a leading ophthalmologist remarked that 100,000 working days per annum were lost in the British Isles by failure of workmen to

wear goggles.

### Cyst of Lacrimal Gland?

MELVILLE BLACK, Denver, presented a baby, aged six weeks, in whose right eye, a few days after birth, had been noticed a white swelling which when the eyes were open lay between the corneal margin and the external canthus. The growth reached as far as

the lower margin of the external rectus muscle. It was soft, freely moveable, of a pearly color, and of cystic appearance and consistency. It might be connected with the lacrimal gland. Operation for its removal was proposed in the course of a few days, the intention being to try to dissect out the growth from beneath the conjunctiva without sacrificing any of that tissue.

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Discussion.—J. M. SHIELDS and C. O. EIGLER, Denver, thought that the size of the growth had increased considerably during the past few weeks.

Epithelioma of the Cornea.

MELVILLE BLACK, DENVER, presented a man of seventy years of age who had come on account of a corneal growth which had existed for a considerable period of time. It had occupied about a half of the cornea and about an equal amount of sclera to the temporal side, and on November 7th had been about three mm. thick. It had the microscopic appearance of papilloma, but of late the portion overlying the sclera had become decidedly vascular, so that carcinomatous degeneration had probably occurred.

Dr. Markley had applied thirty mg. of radium in silver tubes for two hours, and the same dosage had been repeated on the following day. Altho no further treatment had been administered, the cornea was now entirely free from the growth, having only a hazy, slightly roughened appearance where the growth had previously existed, and a pronounced varicosity of bloodvessels on the sclera near the

limbus.

G. F. Libby, Denver. My experience with radium in papillary and epitheliomatous growths around the eye has been a very happy one, and this mode of treatment represents a great advance in our therapy of such cases.

W. C. FINNOFF, Denver. Last spring I showed a case of epithelioma of the cornea. After treatment with radium the growth entirely disappeared. Even with the corneal microscope, after a month or so, we could see no trace of it. Sections of the growth had shown it to be basal cell epithelioma. It is rather desirable to shave off the

growth before using the radium, as the dosage required is thus reduced and it seems possible that the chance

of cure may be improved.

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D. H. COOVER, Denver. In the last year I have seen two cases of this general character. One growth was a carcinoma of the upper eyelid, the diagnosis of which was confirmed by microscopic examination. I removed the growth, and Dr. Markley immediately applied radium, which was used altogether in three doses of two hours each. In over eighteen months the growth has not returned. The other growth was epithelioma involving a half of the upper eyelid. Previous treatment by acids and so on had resulted in marked deformity of the lid. After four treatments with radium it has never reappeared.

J. M. SHIELDS, Denver. In a man of eighty years whose case I reported about a year ago, new nodules had appeared after removal of a marked elevation at the limbus; but after one dose of radium there has been no recurrence in the course of two years.

J. A. McCaw, Denver. The transparency of the cornea has returned, and the patient can now see, whereas

he was previously blind. F. R. Spencer, Boulder, asked to what extent the transparency of the lens was affected by radium.

DR. LIBBY said that Dr. Markley had never seen any disturbance of the lens

from radium.

EDWARD JACKSON, Denver. The highly specialized normal tissues are more resistant to radium than the less specialized.

Retinitis Pigmentosa or Chorioretinitis.

W. C. Finnoff, Denver, presented a woman, aged forty-three years, who twelve years previously had first noticed that her visual acuity varied, and that she saw colored circles which began in the periphery of the visual field and rapidly became smaller and disappeared. There had been no other appeared. symptoms, but the vision had gradually failed until at the time of report it was R. 4/60, L. 6/50. Nyctalopia was not complained of. The family and past history threw no light on the

etiology. Repeated blood and spinal Wassermann reactions had been negative, and there was no evidence of focal infection or other underlying constitutional disorder. The media were clear with the exception of a few fine mossy floaters in the anterior vitreous. There were many fluffy patches of pigment in the retina, arranged concentrically with the disc. The retinal vessels were small and the discs slightly atrophic. Many of the pigment patches resembled bone cor-There was a very striking advanced sclerosis of the choroidal vessels, many of which were apparently entirely obliterated. A diagnosis of retinitis pigmentosa had been made upon the basis of the repeated negative Wassermann reaction and of the absence of other demonstrable etiolcgy. (Dr. Finnoff later reported that, after a provocative course of potassium iodid, spinal and blood Wassermann reactions had again proved nega-

Discussion.—MELVILLE BLACK, Denver. This case has some and lacks others of the typical characteristics. It also began rather late in life for this condition. I believe we must conclude that it is one of the cases of pseudo retinitis pigmentosa. I should not say that these patches of pigment were characteristic. There is no night blind-

EDWARD JACKSON, Denver. The patient was thirty-five years old when she first noticed that the sight was disturbed. The masses of pigment do not have the characteristic delicate lines radiating from centers. The most striking feature of the case is the beautiful picture of choroidal vessels. only case nearly like it which I have encountered in the literature is that shown in a plate in Jaeger's Atlas. WM. H. CRISP, Secretary.

# CHICAGO OPHTHALMOLOGI-CAL SOCIETY.

DECEMBER 17, 1923.

DR. ROBERT VON DER HEYDT, President.

Amaurotic Family Idiocy.

DR. RICHARD GAMBLE, Chicago, presented an infant, 13 months of age, male. The parents were Russian Jews of a highly intellectual order. There were three children, one a girl eight years of age, two years ahead of her class in school. This child had some astigmatism, but was otherwise normal. The other daughter, 4 years of

age, had a congenital squint.

The family history showed no insanity, lues, or any abnormality which might have a bearing on this case. The maternal grandmother presented a rather peculiar condition of the eye, very similar to retinitis pigmentosa, tho the pigment did not extend as near the disc as is usual where vision is so low. She never had hemeralopia. The prenatal history may have had some bearing on the case, as the mother was extremely worried for months.

The child was normal at birth and until about eight months of age, at which time it was noticed that it did not sit up and did not use its legs, being at that time, according to the parents, weaker than it had been at six months. They became worried and consulted Dr. Isaac Abt, who advised examination of the eyegrounds. This examination revealed findings as described first by Warren Tay-the cherry red spot in the macula surrounded by a white area, slightly elevated, about two disc diameters across. The nerves were atrophic. It was extremely difficult to take the vision. The child could see, but it was impossible to determine to what extent. The pupillary reaction to light was sluggish. General physical examination showed the lower extremities spastic, Babinski positive, no ankle clonus or increase of knee jerks. The knees and ankle joints were held in extension. The child appeared otherwise in normal health, well nourished and of good temper. There was marked hyperacu-

Dr. Gamble believed this to be primarily a case of amaurotic family idiocy, of the Tay-Sachs variety. There was degeneration of the pyramidal cells of the brain and of the ganglion cells in the retina, and, secondary to this, atrophy of the nerve fibers. The pyramidal and ganglion cells became intensely swollen, this possibly accounting for the white area surrounding the macula. Parsons had stated that this white area was due to edema, but properly fixed specimens did not support this theory. In another type of this disease, called the juvenile form, in which the same changes were found in the brain, the eye findings were different, there being no cherry red spot, but usually an atrophy of the nerve and occasionally a condition resembling retinitis pigmentosa. When these cases occurred at an older age, the termination was not the same.

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These findings would suggest several questions: first, was there any relationship between the condition of the child and that of the maternal grandmother-that is, any connection between amaurotic idiocy and retinitis pigmentosa; second, would endocrine therapy be of any benefit in amaurotic idiocy, as some oculists recommend its use in retinitis pigmentosa; third, would blood chemistry be of any There was no record of its value? having been done in this case.

Discussion.—DR. DAVID B. said that while Dr. Gamble had presented the most essential points, he thought it might also be of interest to consider some of the clinical findings of the disease, aside from the pathognomonic cherry red spot. The symptoms, which usually appeared from the fourth to the sixth month of life, were first noted in this child at the age of eight months, and were then rather indefinite. As a rule, these children became disinterested in their environment. They were less active, and during the daytime were quite drowsy and slept for unusually long periods. Often parents were first attracted to the condition by the fact that the child did not follow objects with its eyes. In this case, however, the parents did not observe any defect in vision.

The earliest and most characteristic clinical symptom of this disease was hyperacusis, tho at times instead of hyperacusis there might be deafness, and occasionally a loss of sense of smell had been noted. Digestive disturbances were unknown, tho drooling

had occurred in some cases. Physical examination revealed a condition which was difficult to distinguish from infantile cerebral palsy. Rigidity of the extremities was usually present, with hyperactive reflexes. In some instances there might be a flaccidity of the limbs. If the patient was examined at various stages during the course of the illness, one often observed an alternation of rigidity and flaccidity. Nystagmus was sometimes present.

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As the disease progressed, marked weakness of the extremities occurred. Gradually a generalized paralysis resulted, which was usually spastic late in the disease. The patients deteriorated mentally, and eventually displayed no response to any stimulus. They lost weight gradually, and the disease terminated in marasmus.

A case reported by Dr. Isaac A. Abt in 1910 was particularly interesting because of the careful pathologic study which was made after autopsy. All the nerve cells of the central nervous system were involved. The most distinctive changes occurred in the cerebrum. Differentiation of the various layers of the cortex was impossible. Disappearance of the tigroid substance was characteristic. The changes in the spinal cord were similar to those in the cerebrum, involving especially the The cerecells of Clark's column. bellum and postspinal ganglia were least involved.

WILLIAM E. GAMBLE asked what could be done for this child. The theory that it was an inherited disease, was rather hopeless when treatment was considered. A theory that would offer more hope was that there was some poison active in the child's brain, the nature of which was unknown. Two or three things would support that theory. The architecture of the brain in these children was normal in appearance. There was no evidence of faulty development at birth. We would think, if it was degeneracy, the stigmata of degeneracy would be present. Further, these ganglion cells of the brain and retina were selected, much like a poison having affinity for certain tissues-for example, inorganic poisons like lead, which attacked nerve fibers; or tetanus, which attacked the nervous system. The most hopeful theory was that this disease was due to a poison, the nature of which had not been determined.

All that could be done if it was hereditary would be to prevent other children from coming. Kingdon of London had suggested taking the child from the breast, and it would seem that if another child was born to this family it should not nurse from the mother, as it might be taking something from the mother which caused degeneration. At any rate, this child should be taken to a hospital, blood chemistry should be done, and organatherapy might be of benefit. Any suggestions as to treatment would be welcomed.

### Chronic Simple Glaucoma with Operation.

DR. H. W. WOODRUFF, Joliet, presented a woman, 25 years of age, married, no children. Two years ago she noticed she was unable to read clearly. There was no pain, but later frequent headaches developed, especially marked over the temple region. First consulted an oculist in September, 1923, and entered the infirmary on September 14. No other member of the family showed any indication of this disease.

At that time the tension was 42 in the right eye, 40 in the left, and vision 20/25 in both eyes. Fields were moderately contracted, and there was marked glaucomatous cupping in each eye. Eserin was instilled in both eyes daily. On October 10, tension was 21 R. E. and 19 L. E., under eserin. One month later, deep iridectomy was performed on the left eye, and on November 30, the tension was 16 R. E. and 24½ L. E. Iridectomy was performed on the right eye.

Dr. Woodruff said that in showing this case he wished to call the attention of the Society to the method of performing iridectomy described by Dr. Torok of New York, in an article read before the American Ophthalmological Society last June, and published in November in the Archives of Ophthalmology. The principal points in which this operation differs from

the ordinary iridectomy were that a very deep incision was made with a cataract knife, going as far back as possible to avoid actual injury to the iris; then, before the iridectomy, an iridodialysis was performed, or possibly, going more deeply, the ciliary body was separated from the sclera. The iris forceps were held parallel to the wound so that the iris was drawn down and out, and then incised by two cuts of the scissors. This gave an iridectomy that included the root of the iris and afforded better communication with the canal of Schlemm. This technic had been in use only a few months, but seven or eight operations had been performed and all up to date had shown a lowering of the tension.

This case was treated quite thoroly with eserin and general treatment, enemas, diet, etc. The operation was not done until it was found that the tension came up again, and notwithstanding a very small pupil there still was a tension above 30. Then it was decided to operate, and this method was chosen in preference to others, because it was thought to offer something more than the iridectomy heretofore performed, and was believed to be a safer operation than trephining. Dr. Beard's double fixation forceps, which were used in this case, were recommended, as they made the performance of an incision very much easier, absolutely preventing any rotation of the eye when making incisions. Discussion.—DR. VON DER HEYDT

mended that it be done in this case.

Dr. E. V. L. Brown said that the type of case in which this operation should be done was limited to that in which there was no permanent fixation of the root of the iris to the ligamentum pectinatum. A spatula could not be passed from in front and detach the iris unless such attachment was very slight, and was really little more than an apposition of the iris to the ligamentum pectinatum. If it were firmly adherent, it would have to be

suggested the advisability of having a

Wassermann test made in cases of sim-

ple glaucoma in persons in the third

or fourth decade of life, and recom-

dug away, which would mean plunging the spatula against the scleral spur, or more likely thru the free part of the iris and on into the ciliary body. Cases in which such an anterior root synechia could be so detached and filtration thru the ligament pectinatum and drainage out thru the canal of Schlemm reestablished, must be few in number. This operation, like many other procedures, might reduce tension in a goodly number of cases, but not because the iris had been removed from the back of the cornea.

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DR. WILLIAM H. WILDER said he had had the pleasure of hearing the paper read by Dr. Torok before the American Ophthalmological Society, and understood that the main purpose of the operation was to separate the root of the iris from its adhesion to the back of the cornea, so as to insure a free iridocorneal angle when the excision of the iris was made.

Dr. Torok accomplished this by using a thin iris spatula, which, after the corneal incision had been made, was passed under the upper lip of the wound up to the pectinate ligament, keeping it close to the posterior surface of the cornea and thus separating the root of the iris from the cornea. if it was adherent to it. According to Dr. Torok, no harm would be done if the spatula separated the ciliary body from the pectinate ligament or passed into the suprachoroidal space, thus producing a cyclodialysis by the anterior route. Altho he himself had not yet tried this procedure, it would seem to have merit for suitable cases, and he was glad to hear Dr. Woodruff's experience, and also to ask if he had found the technic of any special difficulty, and if the separation of the iris caused hemorrhage or any severe reaction in the healing.

DR. FRANCIS LANE said, that at the laboratory of the Illinois Eye and Ear Infirmary, about sixty glaucomatous bulbs had been studied during the past eighteen or twenty years. Many of these had been subjected to the various operations for the relief of tension. His recollection was that all of them, with but a single exception, which was a case of glaucoma simplex, showed

an anterior peripheric synechia. It would seem that this condition was the most outstanding feature, the relief of which the various operations failed to accomplish, so that permanent reduction of increased tension was

not established.

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Dr. Woodruff (closing) stated that none of the cases had reached the laboratory as yet. He thought everyone was inclined to be skeptical about new operations or modifications of any old operation for glaucoma. He had performed seven or eight of these operations within a short period of time, and had never, in doing as many consecutive operations for glaucoma, secured such results as had been obtained so far. He hoped to give a full report of these cases in the near future. In reply to Dr. Wilder's question whether there was any difficulty in separating the root of the iris; the only thing was hemorrhage, which might come from the incision of the conjunctiva and sclera. That was sometimes annoying, and in the most recent operation there had been considerable hemorrhage, which was of course not serious, but did interfere with the view somewhat. In separating the iris from the sclera, all that one need do is to keep close to the sclera, and then there was no particular danger.

Slit Lamp Work at Zurich.

Dr. Sanford R. Gifford of Omaha, described the course in slit lamp work given by Professor Vogt at Zurich. Forty students were present from all parts of the world, including Jerusalem, Japan, Russia and all the Scandinavian countries. The course was divided into groups of four, each un-der one of Professor Vogt's experienced assistants, and each with a slit lamp, there being sixteen slit lamps in After a lecture in the morning, the rest of the day was given over to examination of patients. About one hundred patients coming from all parts of Switzerland were examined every day, and by the efficient way in which the course was managed, most of the students saw practically all the conditions described in Vogt's atlas, and a good many conditions described in his later articles. Experimental cataracts are being produced at the Zurich clinic by means of ultrared rays filtered by a special method. By this means cataracts can be produced in rabbits to order, within twenty minutes to one hour, and studied in all stages by the slit lamp. It has been found that iron oxid glass will protect animals against this form of cataract, hence the conclusion seems justified that these glasses may be of service in avoiding glass blowers' cataract.

The forms of slit lamp apparatus recommended by Professor Vogt were, the Nitra illumination with micrometer ocular, using the lower magnifications, especially at first, and a carefully focused small bundle of light. The arc slit lamp was also demonstrated, and is of use in some cases, making visible very fine changes. Special tricks of technic observed at other clinics were described. Frese of Berlin used a method of observing the endothelium by focusing first on the sharp bundle of light, then moving the light until the corneal reflex was partly reflected in the band, when the endothelium came at once in view. Several personal cases where the slit lamp had given valuable information were mentioned, including one of siderosis of the lens alone, proving the presence of a foreign body whose location was questionable. Cases of interstitial keratitis had been seen in which folds of Descemet's and infiltrative changes could be seen long before the presence of any vessels in the cornea. Cases of recurrent erosions of the cornea were seen in which, in addition to the areas staining by fluorescein which could be seen by ordinary illumination, numerous fine points, faintly staining with fluorescein could be sent with the slit lamp. This was interpreted as vacuolization or loosening of the superficial epithelium in the area surrounding the ends of the fine corneal nerves, allowing the stain to penetrate between the cells.

Clinical Use of the Slit Lamp.

DR. WALTER H. SNYDER, of Toledo, Ohio, said he thought the reason for

asking outsiders to appear before the Society was in order to obtain an average outside opinion on the use of the slit lamp, clinically as well as experimentally and anatomically. When he first began to inquire about the slit lamp, he was told it was nothing but a scientific toy, but as the earlier writers of books said the same thing about the ophthalmoscope, this was thought rather in favor of it. The question then was to get a satisfactory lamp, and this did not become possible until after the war.

It has been said that it takes some time to become dark adapted, but this had not proved a troublesome factor. The slit lamp, set up with a low power, was in a rather large dark room, and most of those patients who complained of infections or diseases of the anterior half of the eye were examined. By searching with a low power (which should always be done to begin with, finishing with the high power) the dark adaptation took care of itself, and the patient became accustomed to

the use of the lamp. Toledo being a manufacturing city, where many factories use automatic machinery, there are many injuries due to flying foreign bodies. The clinical application of the slit lamp to these cases was about the following: a man reported to the factory hospital on Monday that he had a foreign body in his eye, at least he was suffering from some discomfort which he attributed to the presence of a foreign body. The company surgeon usually made a record of having removed a foreign body, even tho it was one floating in the cul de sac. The eve became steadily worse, and on Wednesday there was a serious question as to what the trouble really was; the company being anxious to know whether they were responsible for the inflammation, or whether it was due to some pathology independent of the foreign body.

In this type of case the slit lamp was of great assistance, as many such cases showed marked cyclitis and no evidence of any foreign body, and further examination might show that the man was suffering from an incipient

iridocyclitis. For this type of case alone the slit lamp would be well Perhaps this case worth having. should be explained a little more fully. being typical of so many. The low power showed no erosion or break on the cornea, but would frequently show many scars of previous foreign bodies. especially if the man was an old em-With a higher power, and focusing on the aqueous, it was seen to be full of cells, generally rising next the iris and falling next the cornea. Focusing on Descemet's membrane, clumps of leucocytes and cells would be discerned, which had been deposited on the endothelium.

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It was advisable to take some practical lessons in the manipulation of the lamp. Most people who did not see its value were those who had a poor lamp, or who had never been properly trained in its use. By using Vogt's Atlas, and by obtaining a little assistance in the use of the lamp and the identification of the tissues no trouble would be experienced. The question had been asked if the patients objected to its use. Private cases did not object, even with considerable photophobia, the only trouble experienced being with litigation cases, who had a defect and tried to exaggerate it. These frequently objected to the brightness of the light, etc., but by starting with the lower power and keeping the bright light at such an angle that it did not fall upon the macula, these cases gave little trouble.

The tissues were discussed in the order in which they were usually seen. First the lids and corneal margin: Not much could be seen in this region from the standpoint of an ophthalmologist. The neurologists are working on varicosities of the capillaries, using a microscope which magnifies the skin at the root of the nail. All these could be seen with greater distinctness and clearness in the corneal margin, and it was probably in this region that this type of work would ultimately be done.

An interesting case was recently seen in New York, in which this was rather a determining factor. An iron worker, about 25 years of age, had noticed for about ten years a sharply defined discoloration in the outer quadrant of one eye. About eight years after it was first noticed, there appeared in the pupillary space a highly pigmented growth. The case had been shown before several of the sections in New York, the consensus of opinion being that it was a cyst of the iris. Sir William Lister did not agree with this diagnosis, and believed it to be a malignant growth, his reason being that he had had a case somewhat similar where this had been the diagnosis.

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Dr. Synder studied the case for over an hour with the slit lamp. First, the growth which occupied the pupillary space was a cyst, because pressure on it would mould the convexity according to the pressure, and there was no doubt there was fluid behind it. Transillumination with the Sachs lamp was made, and it showed absolutely no change in density. This being a very powerful lamp, it may have been a mistake to use so strong a light. His own transilluminator being on a rheostat, the illumination can be variedoften an aid in picking out different densities in the tissues. The high power on the slit lamp also showed that the tissue was not decolorized iris, but a newgrowth, thickly studded with small blood vessels, which looked like threads imbedded in a semitranslucent tissue. There was also a marked dilatation and varicosity of the venous capillaries in the section of the circumcorneal margin, corresponding to the decolorized iris. This has been said to be pathognomonic of a malignant growth somewhere in the globe, and the combination of symptoms led him to state before the operation that he believed it was a malignant growth. It proved to be a spindle celled sarcoma with pigment (a slight differentiation being made between the leucosarcoma, the sarcoma with pigment and the melanosarcoma).

As a routine, it would seem that the whole anterior part of the eye should be quickly glanced over with the low power. In a second it could be changed to a higher power, and then one should examine the posterior surface of the cornea and the aqueous rather care-

fully. It was surprising to find how constantly cyclitis accompanied globe inflammation, and iridocyclitis in some instances can be diagnosed two weeks earlier than could be done with certainty under the old methods.

tainty under the old methods. A condition that was still unexplainable was that in some cases the cells in the aqueous clumped and precipitated on Descemet's membrane, while in others they dropped farther down, blocking the drainage area and possibly causing many an unexplained glaucoma. Examination of the anterior capsule would show why vision could not be improved by lenses, and also would show a very beautiful diagram of previous microscopic synechiae. It was evident that posterior synechiae were more common than would be thought from the previous methods of examination. have been seen whose anterior capsules showed several successive circles of iris pigment, the result of an inflammation of the iris and resultant attachment to the capsule. Pigmentary synechiae being easily broken, the evidence was often incontrovertible that a patient had had many such attacks, even tho this was denied. Much about the appearance of the iris could be recognized as pathologic, but the cause and effect have not yet been studied sufficiently to say with certainty what these conditions mean.

A construction engineer from one of the railroads was seen who complained of a disagreeable sensation in his eye, attributing it to a foreign body. An ophthalmologist removed a foreign body, but the symptoms persisted. There was slight photophobia present, no diminution of vision, but an unpleasant sensation. Ophthalmoscopic examination was negative, but the slit lamp showed a beginning cyclitis. It was found the patient had two badly ulcerated teeth, upon extraction of which, the patient had a comfortable night, the first for over a week. had entirely recovered within a few days, and it was probable that he had been saved four or five weeks of pain and inflammation and consequent loss of vision.

Using the very best corneal loupe

procurable, which magnifies about nine diameters, a haziness may be seen which may be thought due to a cyclitis, but this cannot be positively diagnosed as it can when the individual cells can be seen with a corneal microscope magnifying 30 diameters.

It was of interest to note how many eyes showed remains of the embryonic pupillary membrane, which in some cases have no doubt been taken for posterior synechiae, the result of inflammation. But the position of at-tachment of the strands, when seen by a corneal microscope, easily differentiated these two varieties of syne-Many pigmentary synechiae could be studied with the corneal microscope, and even torn loose after three or four weeks' use of atropinpreferably the disc rather than solution to prevent the constitutional effect of the drug. The pathologic con-nection between the various tissue changes which were seen could not be recorded, but if they were recorded, the explanation would come later when more men had studied them.

The slit lamp was always useful in explaining unimprovable vision. many instances the previous history of the eye could be accurately guessed, when the haze of the cornea, the cells on Descemet's membrane and the pigment on the anterior capsule were noted. One could definitely state to such a patient that he had had a long continued inflammation, even tho this could not be recalled, and that the glasses selected empirically could not be changed to improve the vision. There is probably a distinct connection between the calcareous degeneration of the capsule and the cataract which might ensue from penetration of this calcareous degeneration by the acqueous. It was possible to study the changes which took place in the lens, called cataract. Several well defined conditions are visible, not explained by our present knowledge of

Examination with the slit lamp commonly shows a hernia of the vitreous, protruding thru the hyaloid membrane.

One case was recalled where the slit was of service in determining an incipient sympathetic inflammation of the eye. A boy had lost the sight of his right eye from an injury, and later the left eye developed some inflammatory condition, followed by deposits of pigment on the capsule and on the posterior surface of the cornea. According to Vogt, this condition was suggestive of an incipient inflammation of the sympathizing eye. right eye was then enucleated, with no further trouble, but the pigment would always remain to show the beginning of what would no doubt have been a serious matter. A few of the earlier conclusions had been found to be inaccurate and misleading, but there was no doubt that the extensive use of the slit lamp would result in a new pathology and physiology of the eye.

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### Newer Anatomy of Lens, and Development of Cataract.

DR. EDMOND E. BLAAUW, of Buffalo, stated that he felt a deep sense of gratitude toward President Von der Heydt, who in his translation of Vogt's Atlas had given equivalents in the English language for many terms heretofore unknown. Many of the members of the Society, who had a knowledge of German and had read Vogt's articles, would appreciate the enormous amount of work involved, the vernacular being so different that even those familiar with German would find many words and expressions not ordinarily known.

In the limited time allotted only a few slides could be shown, which however, would be typical. The first showed a section of the cornea as seen with the slit lamp. It showed the anterior and posterior surfaces and the diagonal cross section, the latter being useful for the determination of depth. The nerve fibers were not as heavy, or numerous, when seen in nitra lamp illumination. It also gave an idea of the thickness of the cornea, and its increase toward the periphery could be studied. In the reflected image of the posterior surface might be seen the carpet of hexagonal endothelial cells.

Next was shown a form of iritis. The exudate may be on the anterior

surface or may extrude from behind brown, the blue form being incipient, at the pupillar border. The slit lamp showed a cross section thu the lens. It was possible to identify the anterior and posterior surfaces of the lens, as well as the various lamellar and nuclear surfaces between these, by their characteristic contour and sutures. The lens at ages thirty to forty was composed of three main parts, the embryonic and adult nuclei, and the cortex. In the center of the embryonic nucleus was a clear interspace. surface of the embryonic nuclei showed anteriorly the vertical, and posteriorly the inverted Y sutures. If a line was drawn between the centers of these sutures and continued posteriorly, the posterior pole of the lens was arrived at. This line continued thru the lens was the anteroposterior

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The next illustration showed the adult nucleus, a line of demarcation developing within the cortex after puberty, new cortex developing continously thruout life. The lens contracted as it grew older. Its sclerosis constituted presbyopia. The increasing density of the nucleus was compensated for by the flattening of the lamellae at the axis of the lens, thus keeping the refraction in balance.

The anterior surface of the lens showed the shagreen. The posterior shagreen became increasingly yellow in age, due to the coloration of the lens thru which it must necessarily be seen.

In the next illustration were seen numerous flat globules, the identity of which had not been determined. They were seen only by transillumination, and presented what Vogt had termed the subcapsular vacuolar layer in cat-

Coronary or wreath shaped cataract, a common form seen only under mydriasis, was found in twenty to twentyfive percent of young healthy eyes, according to Vogt. The flat opacities were club shaped, and situated in a wreath around the equator between the lamellae, and in very advanced cases there were discs or rings like halos toward the poles. The club like opacities might be blueish-green or

the white form condensed. form of cataract was always progressive, but owing to its involving the periphery of the lens, did not lower visual acuity.

Next was seen a beginning senile cataract. The opacity lay deep within the cortex. In front of this was very frequently found the lamina, separated within the cortex. The illustrations showed that senile cataract did not form subcapsularly, in agreement with Hess, to whom should be given great credit for his exhaustive research work on the lens.

The next illustrations showed fissures filled with fluid and lamellar separations, both presenting the most common types of incipient senile cata-The appearance of the anterior polar cataract was interesting because it demonstrated that this disturbance originated when the pupillary membrane was still present before birth. A certain amount of the lens disturbance was carried inward by the successive apposition of new lens fibers during life, this creating duplicate and multiple impressions of the lesion at The black ring successive depths. around the lesion was always found in anterior capsular cataract. zone was different in its behavior to light. If one focused on it, one would not find the shagreen in this halo like zone around the lesion.

Next was shown a specimen of nuclear cataract demonstrating a real change of senility, where sclerosis had advanced to opacification.

The following slide showed a com-posite of most forms of cataract as they were found in the lens, presenting the embryonic lens, the zone of adult nucleus, the cortex and the capsule, each of which had its own pathology, and the location of which gave a clew as to the time of origin. There was a form of nuclear opacity, found in about one-fifth of all eyes, called the anterior embryonic nuclear cataract, which did not interfere with visual acuity and was probably due to the loose cells found within the embryonic lens vesicle. Lamellar, coronary, punctate, fissure and suture, wedge

shaped, and the various types of incipient senile cataract were shown. Mittendorf, forty years ago, found symmetric dots on the posterior capsule, which were now identified as ampullae shaped attachments of the

hyaloid artery.

Pictures of the vitreous were shown, which were interesting because here-tofore there had not been a definite idea of the structure of the vitreous. The supporting structure showed as successive curtains folded like portiers and seemingly attached to the roof of the eyeball. These at times appeared wrinkled like tissue paper. There were some vascular remnants at the back of the lens and capsule. Many eyes showed the physiologic hyaloid artery remnant in this place.

Discussion.—Dr. Van Der Heydt said that the endothelium on the back of the cornea could be very easily seen by making the patient look nasalward and using the periphery of the cornea, where the two corneal surfaces were not parallel. In order to get the reflecting image, the angle of observation and illumination should be widened and kept at equal angles to the plane of the pos-

terior cornea.

DR. BLAAUW, in answer to Dr. Snyder's questions, and closing the discussion, said he thought the slit lamp had taught him to recognize cataracta complicata, the form of cataract secondary to eye disease. It formed under the posterior and sometimes below the anterior capsule, causing a decided lessening in visual acuity because of its density, tho the lens in its anterior aspect seemed clear. If these cataracts were extracted a clear black pupil would be the result.

CLARENCE LOEB, Corresponding Sec'y.

## OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL AND OTO-RHINO-LARYNGOLOGICAL SOCIETY.

Council Bluffs, Iowa. January 19, 1924.

DR. CHAS. S. JAMES, President

Congenital Staphyloma.

DR. THOMPSON presented a child of 2, showing a dense staphylomatous

scar of the right cornea which was present at birth. There was no conjunctivitis present and no gonococci were found, altho the child's mother apparently had a gonorrheal infection. Question of the etiology was discussed and it was proposed to excise the staphyloma leaving a good stump for an artificial eye.

## Operation for Congenital Cataract.

DR. DEAN presented a boy 15 years old, who had been operated on for congenital cataract in the left eye years before. He showed an excellent operative result with a round pupil and obtained normal vision. Dr. Dean's operative procedure was a discission followed by removal of the soft cortex by suction after three or four days. The suction apparatus was demonstrated.

### Anomaly of Optic Discs.

DR. DEAN showed a case of unusual anomaly of the disc in both eyes, affecting a woman of 40 years old. The region of each disc was occupied by a smooth and rounded prominence, extending three disc breadths forward, from the edges of which the retinal vessels appeared. Vision was normal. Various suggestions as to the nature of the anomaly were made, one being that it was probably an extreme case of drusen of the optic nerve.

# Mercuric Cyanid Injections for Incipient Cataract.

DR. DEAN presented a cataract case, in which a cyanid injection had been given two years before. Vision at that time, right eye, 20/50-2, it is now 20/20-2; left eye, 20/30 now 20/20-4. The sector like markings which were first present are still to be seen; but the opacities between them seem to be considerably clearer than they were at that time.

The paper of the evening was a report by Dr. Dean of the results after two years or more in cases of incipient cataracts injected subconjunctivally with mercuric cyanid. Charts were shown with the vision recorded on 24 cases from time to time. A fair number of these showed actual improvement in vision, and nearly all of them have at least shown no further loss of vision since the injection. One case

was reported in which vision was 20/30 at the time of injection and which later slowly decreased to 20/50 and 20/70 with correction. This was a case of sclerosis of the lens and nucleus, requiring strong concave lenses.

Dr. Dean believes that the cases where best results are to be expected are early cases, in which the opacity involves the cortex. Cases such as the one here reported in which the nucleus is affected or, in general, later cases, are not so much affected by the injections. Twenty minims of 1-5000 mercuric cyanid are injected freely behind the globe, and with the use of scopolamin-morphin no pain is complained of.

Discussion.—Dr. F. S. Owen reports that he has used similar treatment in a number of cases during the past years. In most of them he observed no further progress of the cataract. In no cases, however, was there actual improvement in vision to be detected. The reaction is very severe in some cases, in one the chemosis being so marked that the lids could not be closed for 24 hours. He believes results justify the use of cyanid injections in all early cases of cataract. In injections he only uses ten minims of the same solution mixed with novocain.

Dr. James M. Patton has been very much interested in the report of Dr. Dean's cases and in the results of injections on his own patients. he has seldom seen any increase in vision following the injections, he has a decided impression that the injections materially retard the progress of the lens opacities. He uses 1-5000 mercuric cyanid, made up in 5% dionin solution, which if preceded by topical applications of cocain produces no pain. In some cases it is true that the opacities have progressed in spite of the injection. No bad results from the injections have been seen. In one case the ocular congestion lasted a long while, and finally cleared up only after a diseased antrum had been opened up on the same side.

DR. THOMPSON has also used the injections in a number of cases. By using hot applications soon after the

injection, the pain is minimized and the edema is not so extreme. In a case which he observed in another city, he saw a corneal ulcer develop after the injection, but in this case the injection was made too close to the cornea.

DR. DEAN, in closing stated that novocain is not necessary, if the scopolamin-morphin is used; and he does not use hot applications, as the congestion and edema seem to be part of the desirable effect from the injection.

S. R. GIFFORD, Secretary.

# BALTIMORE CITY MEDICAL SOCIETY.

DR. DOWNEY, Presiding

## Embolism of Central Artery of Retina.

Dr. Moses Savage presented a white man, 51 years of age, with a typical picture of embolism of the central artery of the retina, following an injury to the leg. Dr. Savage stated that he had had no physical examination made of the patient, but he could not see how the injury to the leg would have produced embolism.

### Zonular Cataract.

DR. E. A. KNORR showed a white girl, 7 ears of age, with a zonular cataract in the left eye and a very slight posterior polar opacity in the right. There was no history of heredity obtained. Dr. Knorr stated that he advises against needling of all congenital cataracts until 10 or 12 years of age, as occasionally eyes fail to develop when operated upon during infancy.

### Ruptured Choroid.

DR. E. A. KNORR also exhibited a case of a colored man, struck in the right eye, followed by loss of vision. The vision is now 2/200 and the patient has a V shaped whitish line extending into the macular region with some extravasation of blood. Dr. Knorr diagnosed the condition as one of ruptured choroid at the macula.

Discussion.—Dr. CLAPP stated that he believed this to be a fold of the retina and not one of rupture, as it seemed to him that these streaks were slightly elevated and were produced

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by high-lights from the elevated retina. Acute Neuroretinitis.

DR. E. A. KNORR reported on a young colored woman giving a history of previous dimness of vision, who developed very acute trouble during a recent pregnancy. The urine being loaded with albumin, systolic B. P. being 230, the vision in the right eye was 8/80 and in the left eye 8/200. The history was rather vague as to when the condition developed. Dr. Knorr thought the prognosis much better since it was associated with pregnancy.

## Retinitis Pigmentosa.

DR. E. A. KNORR reported the case of a white man, about 60 years of age, with a history of night blindness, who showed white nerves, contracted arteries, sclerosed choroidal vessels and excessive pigment deposits in the superficial layers of the retina. The fields showed a ring scotoma. No history of consanguinity or heredity obtained. This case he diagnosed as retinitis pigmentosa syphilitica.

A second case was that a white girl of 29 years of age, with a yellowish nervehead, contracted arteries, deposits of pigment in superficial layer of the retina, a very small contracted field, no history of family trouble or of consanguinity obtained. This he diagnosed as a typical case of retinitis

pigmentosa.

Discussion.—Dr. Knorr was asked if retinitis pigmentosa was ever caused by syphilis, and if so would this correspond with the classifications given by Mr. Treacher Collins. Cases were discussed by Drs. Downey and Mills.

Dr. Knorr in reply stated that he considered some cases as being the result of a syphilitic infection.

### Visual Test.

DR. Downey presented an apparatus for testing vision nearer than 20 ft., which consisted of an electric light attached to a board upon which the test object was placed. This could then be brought forward by means of a cord any distance necessary. The apparatus was also equipped with a dim

light apparatus in which he could get five different degrees of luminosity.

C. A. Clapp, Secretary.

## MEMPHIS SOCIETY OF OPH-THALMOLOGY AND OTO-LARYNGOLOGY.

DECEMBER 11, 1923

DR. R. W. HOOKER, presiding.

## Subluxation of Crystalline Lens.

W. LIKELY SIMPSON presented G. S., colored, with the following history: One week ago was struck in right eye. Since that time the eye has been very inflamed and very painful. R. fingers 1 foot, L. 20/30. R. lens subluxated to the nasal side, the temporal edge being pushed anteriorly into the pupillary area. The outer and upper part of the pupil clear. Then lens is fairly clear but tremulous.

Divergent Squint.

DR. M. B. SELIGSTEIN reported the case of E. H., age 16, who complained of crossed right eye since birth and came to have it straightened. Examination showed a divergent squint of right eye of about 30 to 35°. Vision R. light perception. L. 20/20. Fundus: No lesions seen.

Treatment. Under local anesthesia a Reese resection of the internal rectus and a complete tenotomy of the external rectus of the right eye were done. Stitches were removed on the 10th day and he was refracted under atropin. R. Plano, L. 0.50 S. © 0.25, cy. ax. 60°=15/10.

Value of Photographs in Case Records.

DR. E. C. ELLETT showed a series of photographs to illustrate the value of photographs as part of a case record, and the ease with which satisfactory pictures can be made with a small camera in the office.

Glassball Implantation.

DR. ELLETT showed an eye that he had removed three weeks before following an automobile accident in which the globe was cut by a piece of glass. The interesting feature was to notice the considerable amount of

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Paralysis of the Cervical Sympathetic.

DR. E. C. ELLETT presented a woman aged 40, who in April, 1920 had the left breast amputated for cancer. In January, 1921, the left eyelid drooped, and a lump appeared on the left side of neck. The lump was hard and lay above the clavicle, and by the sternocleidomastoid muscle. A tonsillectomy was done. Left eye showed ptosis—pupil 6 to 4 mm., and active. Vision normal.

D. H. ANTHONY, SECRETARY.

## NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNOLOGY.

Meeting of December 17, 1923. Dr. E. B. CAYCE, Chairman.

### Bilateral Chorioretinitis.

Dr. J. J. Frey presented the case of Mrs. H. D., widow, age 42, who first consulted him in October, 1923. She gave a history of hay fever for the past several years. In 1918 the patient fell, striking the back of the head on the floor. There was vertigo but no immediate impairment of vision. Three months after the fall the vision of each eye began to fail. The failure has been

progressive. At present the vision of each eye is 20/200. The patient notices dark objects in the field of vision.

Examination: The eyes present no change externally. In each fundus there is marked diffused degeneration of the retina, shown towards the equator in each eye by pigment which is similar to, but not identical with, the pigment in retinitis pigmentosa. It is similar to it in that it is noticeable all around the equatorial zone and gets more marked as we go forward and less noticeable as we go backward. It differs from retinitis pigmentosa in that the usual crows-footshape of retinal pigment is absent, and that night blindness is not present. Furthermore retinitis pigmentosa does not show the striking central changes which are present in each eye. These macular changes are suggestive of old chorioretinal changes with more or less pigmentation. The case seems to be one of atrophy of each retina with, as is usually true in such cases, more or less involvement of the choroid. A diagnosis of progressive bilateral retinitis with chorioretinal atrophy was made. blood Wassermann was negative. Sinuses negative by X-ray. The tonsils were removed October, 1923, without improvement of vision. A dentist extracted a few of the teeth without improvement of vision.

HILLIARD WOOD, Editor.

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JEAN MATTESON, Room 1209, 7 West Madison Street, Chicago, Ill.

# ACADEMIC INSTRUMENTS AS AIDS TO THERAPEUTICS.

The paraphernalia of the ophthalmologist accumulates with the passage of years necessitating rearrangement and reassortment of utilities with the scrapping of obsolete and worn out material.

A few of the personnel of the profession act as scouts—the point of the advance guard, inventing methods, purchasing all, or most of the new and costly instruments and reporting upon their efficiency from time to time to the main body. Their reports lead to adoption of general plans with uniformity of equipment and technic. Therefore it is well from time to time to make an inspection and to locate the positions of such instruments in actual practice.

The main body of ophthalmic specialists gets along very well with the regulation fittings of the examination, treatment and surgical rooms, which suffice for ordinary diagnosis and treatment. It is only in the larger cities that a few men possess, and fewer use, extremely expensive and complicated apparatus such as the slit lamp and corneal microscope, the

Gullstrand binocular ophthalmoscope, light and dark adaptation apparatus, the more complicated and specialized machines for measuring the visual field and the ocular muscle balance; all of considerable diagnostic value but available only to those whose emoluments allow and whose tastes apply to these impedimenta. "For those who like this sort of thing I think that this sort of thing would be what they would like" "Chacun au son gout!"

Perhaps the foregoing remarks may seem trite, but the recent publication of an essay by Arthur J. Bedell of Albany, ("The Lens as Seen with the Gullstrand Slit Lamp and Corneal Microscope," Journal A. M. A., February 4, 1924) and particularly the discussion participated in by some of our best known authorities is decidedly illuminating for these contentions.

This instrument has been fairly constantly used by the writer of this editorial for more than a year. While he has had a certain satisfaction in corroborating diagnoses made under lower magnification and lesser illumination by other means, and has perhaps in some cases made a more exact diagnosis and evolved a more definite

prognosis, seeing the reason for lowered visual acuity in hernias of the vitreous into the anterior chamber, following removal of cataracts in capsule, and opacities of the vitreous after discissions of the posterior capsule, he is forced to the conclusion that this is a research and laboratory instrument and would be only a decorative addendum to the armamentarium of the average oculist. As to the economic side, he can not say that the instrument has come within a small fraction of paying its way, or that it will ever recompense for the expense or painstaking application necessary in its use. It is hard on the eyes of the patient and trying to the nerves of the examiner.

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The large Gullstrand binocular ophthalmoscope is even more an instance of an ophthalmic extra. That, too, was tried by him for a year and is now relegated to dust and desuetude. The same may be said of the complicated phorooptometers, the light and dark adaptation apparatus, the fancy arrangements for figuring out the muscle balance, and even extra instruments for the visual field, not to speak of suction instruments for extraction of cataract, and other apparatus, which are not necessities for skillful work.

Such adornments to the average office are not really necessary for good work, nor is the money available to the general run of the profession at least for the first few years of the young man's practice, and they may be left to the advance guards to demonstrate their value.

H. V. W.

# LABORATORY AND CLINICAL INSTRUMENTS.

Any method of exact examination of the human body, useful in the laboratory to extend the knowledge of anatomy, physiology, or pathology, might be applied in clinical work. As a matter of fact, many of our important methods and instruments for clinical diagnosis have come to us from laboratory uses. But the laboratory instrument mostly has to go thru a distinct and important development,

before it finds its proper place in the clinic.

The microscope applied to the examination of the living eye must go thru such a stage of development. For any method of examination to reach high value in clinical work, it must give its benefits with the greatest economy of time. Only in this way can it become useful in the largest number of cases. Economy of time comes in two ways. Practice in the use of an instrument, as the opthalmoscope, enables the observer to read, at a glance, the fundus picture he first became familiar with by many hours of hard work; and the significance of which was only established by years of study and discussion on the part of laboratory workers. The second need is evolution of the instrument in the direction of convenience, simplicity and cheapness.

Such evolution from academic to clinical usefulness is well illustrated in the history of ordinary compound microscope. Some of the earliest recollections of the writer relate to his father's microscope. It was one of Zentmayer's "Great American" stands, 15 or 18 inches high, with mechanical stage and wonderful accessories; and it cost over three hundred dollars. It was brought out from its case occasionally, to exhibit the wonderful powers that it had, and its marvelous mechanical perfection; but its owner never mastered it, so as to make it auseful instrument in his studies. It was far less useful for biologic research than the little hand magnifier he carried in his vest pocket. Twenty years later a Zentmayer's "Students' Microscope," that had a simple, accurate stage and two objectives, contained one-quarter as much brass as the other, and cost forty dollars, replaced the wonderful machine of earlier years, and in daily use proved an extremely valuable help in the study of mycology.

The corneal microscope of today, with its apparatus for slit lamp illumination, is a wonderful example of mechanical ingenuity and accuracy; but it is not adapted to utilize physiologic coordinations; and so is poorly

suited to constant use and real extension of human powers in clinical work. A three-quarter inch Coddington lens, with a good convex lens for focal illumination, is a more generally serviceable instrument; and it will show many of the things that some observers have not seen until they looked thru the corneal, compound microscope.

The corneal microscope is to be a great asset for the ophthalmologist of the future. As the significance of what it shows is gradually learned, and its development brings it nearer to meeting the conditions and needs of ophthalmic practice, it may come to occupy a place in the armamentarium of the oculist, and the history of opthalmic science, quite equal to that of the ophthalmoscope. Those who are working with it now are pioneers and discoverers; with all the isolation and obstacles that make discovery a notable achievement.

But this broad, new field will hardly be developed and utilized by its discoverers. Those who come after them, with instruments better adapted for the purpose, will cultivate this field and cause it to bring forth a rich harvest of therapeutic results. Just at present, easy access to this new region of knowledge is the most urgent need. An improved binocular magnifier, with simplified, powerful illuminating apparatus, would connect what we already know with the appearances recently discovered thru the corneal microscope; and so would make the new discoveries of general, practical importance.

Something of this kind of adaptation is going on with instruments for investigating the visual field. They are based on facts and principles known and understood a generation ago. But greater cheapness, convenience and general availability cause the Peter's campimeter and the various scotometers to be utilized in a hundred cases, where the older, elaborate, registering perimeters would not be used once. Instruments and methods for studying light adaptation must go thru a similar process of evolution and

simplification. Percival has started us in this direction.

The laboratory instrument is born of the desire of the investigator for measurable exactness, and the ambition of the mechanician for mechanical perfection and accuracy. The clinic instrument comes from the practitioners knowledge of physiologic coordinations, and his desire for practical diagnostic and therapeutic results. Let there be more and better laboratory instruments; but from them, by evolution, must and will come others fitted for clinic use.

### E. J.

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### ANNUAL MEETINGS.

The great gatherings of ophthalmic interest in the United States begin this year with the meeting of the American Medical Association in Chicago. The sessions of the Section on Ophthalmology will be held in the mornings, beginning Wednesday, June 11, and continuing to Friday, June 13. Like all the other Section meetings, they are to be held on the Pier, well out from the city, above the blue waters and in the cooling breezes of Lake Michigan.

On Monday, June 9, the American Board for Ophthalmic Examinations will hold its examinations at Cook County Hospital, where a wealth of clinical material is available for its purposes.

On Tuesday, June 10, at 6 P. M. will be held the dinner of the subscribers to the American Journal of Ophthalmology mentioned below.

The meeting of the American Ophthalmological Society will this year be held the week following that of the American Medical Association. It will be at Hot Springs, Virginia, on June, 16, 17 and 18. It, too, will have morning sessions, and an evening session, but the afternoons will be given up to golf, and walking and riding thru that beautiful region of the Allegheny Mountains. Probably a special car, or more than one, will take members and guests from the Chicago meeting to Hot Springs.

The Pacific Coast Oto-Ophthalmological Society meets this year at Portland, Oregon, July 10, 11 and 12. Its guest of honor will be Sir John Herbert Parsons, whose presence will help an excellent general program to draw attendance of members from all the Pacific Coast region.

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The Colorado Ophthalmological and Oto-Laryngological Congress will meet in Denver, August 1 and 2. Preceding it, beginning July 21, will be given a two weeks intensive course of graduate instruction, similar to the one given last year, which awakened such enthusiasm and interest on the part of both instructors and students.

The last, but in some respects the greatest gathering of the year in English-speaking America, will be the meeting of the American Academy of Ophthalmology and Oto-Laryngology at Montreal, September 15 to 20, inclusive. The meeting of the Academy will be associated with another instructional program, an intensive course like those that were such notable successes in the past three years.

The national organizations of ophthalmologists in Europe will hold their meetings for 1924 as follows:

The Annual Congress of the Ophthalmological Society of the United Kingdom will be held at Glasgow, May 1, 2 and 3.

Le Congrés de la Sociètè française d'Ophtalmologie will convene at Paris, May 12.

Die Ophthalmologischen Gesellschaft will meet in Heidelberg, June 12-14.

The Oxford Ophthalmological Congress will be held at Oxford, July 2-14.

# ENGLISH SPEAKING OPHTHAL-MOLOGISTS.

The British Journal of Ophthalmology states: "We understand that a Convention of English-speaking Ophthalmological Societies will be held in London in July, 1925, under the aegis of the Ophthalmological Society of the United Kingdom. We expect to be able to publish details at an early date."

# THE JOURNAL DINNER.

Under the management of Dr. Casey Wood, the Ophthalmic Record Luncheon, held each year at the time of the meeting of the American Medical Association, was an important gathering of those working for that publication. Since the consolidation, a dinner for the workers on the American Journal of Ophthalmology has been held annually until last year; when it could not be arranged without conflict with the dinner tendered Dr. de Schweinitz by the ophthalmologists of San Francisco and vicinity.

It is felt that every subscriber to the JOURNAL should be counted in the ranks of those who are working for it. To promote broader fellowship and better understanding, a dinner will be held at 6 P. M., Tuesday, June 10, at the Sherman Hotel, Chicago. A blank form for reservation of seat will be found in our advertising pages.

### BOOK NOTICES.

Parenchymatous Keratitis, Interstitial Keratitis, Uveitis Anterior. By W. T. Holmes Spicer. Paper, 8 vo., 64 pages, 41 illustrations, London, Geo. Pulman and Sons, 1924.

This essay, awarded the Gifford Edmonds Prize in Ophthalmology, is published as one of a series of monograph supplements to the British Journal of Ophthalmology. To subscribers to that Journal, it is issued for three shillings, sixpence, to others for five shillings.

It is preeminently the kind of publication that may be issued in this form. It is complete in itself, too long for a journal article; not big enough to make a formal volume, yet worthy of independent existence. It is a successful attempt to put before those who are trying to become masters in ophthalmology, the gathered wisdom of a professional life, with regard to an important practical subject.

The three names that head this monograph are used as synonymous, chiefly the first two are employed, the preference being in the order given. It is recognized that the mass of cases

are syphilitic in origin; yet "syphilitic keratitis" would refer to the cause alone, and would exclude smilar cases from other causes. Of nearly seven hundred cases, notes of which have furnished the basis of this work, 90 per cent were due to congenital syphilis, 3.3 per cent to acquired syphilis and 6 per cent to other causes. Of the cases due to congenital syphilis, 61 per cent were in females; of those due to other causes (keratitis profunda) 58 per cent were in males. Among the causes of this latter group, first mention is given to the large amount of alcohol these patients consume. But "a small number seemed to be in perfect health and were regular and abstemious both in food and drink."

The outsanding feature in this monograph is the large number of illustrations that bring before the reader the clinical conditions encountered, as they never can be portrayed in words. The number of separate cuts is indicated above; but it is not there indicated that one illustration often represents both corneas of the case, or a single cornea that shows two or more quite different clinical manifestations of the These illustrations are all based on Mr. Spicer's sketches of his cases. Those who heard his lecture in Instructional Program at the Washington meeting of the American Academy last autumn, and saw how he illustrated it, will know the peculiar teaching quality of his handwork. It should be noted that each illustration has its appropriate legend, and that these together take up about onefourth of the work.

As to the clinical appearances of parenchymatous keratitis and the order of their succession, they are frankly connected directly with the presence of the spirochete in the affected tissue, and the progress of the reactions it excites. These reactions are considered under the heads: Haziness of the Cornea, Endothelial Catarrh, Keratitic Precipitates, Forms of Precipitates, The Uveal Layer, The Vascular Invasion, Evidence of Congenital Syphilis in Teeth and Facial Aspect, Acquired Syphilis, Other Causes, Tuber-

cle, Other Diseased and Abnormal Conditions, Relapses and Recurrences, Course and Duration of Attack, Variation in the two eyes, Interval between the two eyes, Injury, Immunity and Re-Infection, Pathology, Treatment, and Keratitis Profunda.

All practical ophthalmologists are to be congratulated on having at their command such a monograph, clearly and beautiully written in classic English. To make acquaintance with this subject in preparing for ophthalmic practice, to find assistance in meeting the difficulties and understanding the significance of particular conditions, to view the whole field for the selection of points bearing on a particular phase of parenchymatous keratitis, this work presents in condensed form all the essentials.

E. J.

Atlas der Histopathologie des Auges. By Dr. Adalbert Fuchs, Privatdocent der Universität Wien. Boards, 144 pages, 44 colored plates. Leipsic and Vienna, F. Deuticke, 1923.

This work is essentially forty-four colored plates, representing 191 microscopic specimens, and eighty-eight pages of text explaining them, with a dozen pages of preliminary matter, index, etc. The plates and preliminary matter are attached to the back; but the explanatory text and index are bound in a separate paper back, and can be slipped out of the board binding and laid alongside for use with the plates.

The first part, containing the plates, has a list telling what each of the two to seven figures on a plate represents. All are evidently from paintings, each based on a certain microscopic slide. Generally some particular part of the eyeball is shown, sometimes a section across the whole globe, a few of the optic nerve behind the eyeball, and one of the normal frontal bone to compare with ossification within the eyeball. Of course, many of the sections include parts of the tissues adjoining the globe; but there are none taking up the accessory organs, like the lids, lacrimal gland, etc. Most of the sections have been stained with hematoxylin-eosin, and the colors are

beautifully reproduced.

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In the first part, with the plates, are included a preface by Prof. Ernst Fuchs, an introduction by the author and a list of the plates and illustrations, which have thus with them a general key to their meaning; even without the text and alphabetic index, that make up the second part. preface points out that the pathologic anatomy of the eye has been neglected and that it is a field essentially belonging to the ophthalmologist, in agreement with the thoughts put forward in this journal, page 159. Prof. Fuchs had wished he might publish such an atlas. This one, written by his son, is the first of its kind, artistically published in colors; and he hopes it will help the practicing ophthamologist to place his clinical knowledge on an anatomic foundation.

The introduction points out that pathology is the basis of internal medicine; and that in the eye, on account of the small size of this organ and the thinness of its membranes, pathologic anatomy becomes histology. Dr. Fuchs makes his acknowledgment to teachers and colleagues and particularly his father and Prof. Meller.

Of course, the study of these pictures is not the equivalent of an actual study of the sections on which they are based; but it may be the best assistance in this direction that will be available to many conscientious workers in ophthalmology. It will help them to understand the clinical pictures they encounter. It must also help the operator to make such an acquaintance with the results of operations good or bad.

In the explanatory text, the subject of each illustration is accompanied by a statement of the magnification under which it is represented. This is given, not in terms of the objective and eye piece thru which it was viewed, but in diameters of actual enlargement, which is very much better, because it will be instantly understood by all who read it.

Fuchs' Atlas is a most welcome addition to any ophthalmic library. We hope very soon to notice an edition of it in English, in which shape it will be most easily used by the mass of our readers.

"The Practical Medicine Series" under the general editorial charge of Charles L. Mix, A. M., M. D., Volume III, "The Eye, Ear, Nose and Throat," edited by Casey A. Wood, C. M., M. D., D. C. L., Charles P. Small, M. D., Albert H. Andrews, M. D., George E. Shambaugh, M. D., Series 1923, Chicago. The Year Book Publishers.

This annual summary of progress in the art and science of medicine is ever welcome. It appears this year in eight small volumes of which the III is that on the eye, ear, nose and throat.

During 1923 an unusually large number of contributions of exceptional merit appeared in ophthalmic literature, especially dealing with those subjects more or less associated with some other bodily function and there-

fore of general interest.

Certain refinements in methods of ophthalmic diagnosis have been announced, as ophthalmoscopy by red free light shown by Vogt, Green and Jackson; the slit lamp and binocular ophthalmoscope of Gullstrand, the former combined with the corneal microscope, permitting a highly magnified view of tissue examined, with considerable penetration in depth; really microscopy of living tissue. Examination of the eye by filtered sunlight according to Edward Jacksona direction towards simplicity, but hardly available to us Northerners, especially of the Pacific Coast, the region of "filtered sunshine." All of these methods and adaptations with very expensive apparatus are marvelous in their theoretic promise but really of problematic therapeutic value to the curative" doctor.

Wilkinson uses a strabismus brace and a new form of suturing the tendons in squint. It is to be feared that the strictures laid upon the treatment of trachoma by caustics and mechanical methods, made by Newman, would apply only to follicular conjunctivitis, a distinct affection, and that its treatment by rest and weak solutions of

zinc, etc., would be of little avail in the case of true trachoma or the prevention of practical blindness therefrom.

Now comes J. S. Clark and Chamberlain with recommendations for combined intra—and extranasal operations for the cure of dacryocystitis, following the methods of West, Mosher and

others.

Ewing now recommends abscission of the capsule in cataract by forceps, but 13 cases out of 105 required secondary discissions. Crisp has an extensive article on the first aid of eye accidents by the general practitioner, a rather risky procedure for the patient in these days when specially qualified practitioners may be found in every small town. J. Maitland Ramsay's contributions to the clinical significance of failing eyesight is an epic.

Certain advances have been made in the surgical treatment of accessory nasal sinuses, the balance now swinging towards conservation. Desensitization of hay fever patients is now in vogue. Ozena is helped by operation. Adenoids and tonsils are still being cut out and the larynx gets more attention than in previous years. Certain authors are curing stuttering and speech defects. So the medical world rolls along towards prevention of disease and perefection of technic.

H. V. W.

Intranasal Surgery. By Fred J. Pratt, M. D., F. A. C. S. and John A. Pratt, M. D., F. A. C. S., Assistant Professors, Eye, Ear, Nose and Throat, Medical School, University of Minnesota, Cloth, 350 pages, 195 illustrations, Philadelphia. F. A. Davis Co.,

Up to a generation ago, the nose was a sort of no-man's-land. The "throat and lungs" had received special attention from certain investigators and practitioners; otology had become a recognized specialty practiced exclusively by a few, and by many more in conjunction with ophthalmology, which had risen into prominence as a special branch of medicine two generations before that; while dentistry had asserted its importance almost one hundred years ago. Here was the nose

having important relations with the mouth, eye, ear and throat, occasionally attracting attention from all the head specialists; but rhinology received only meagre and incidental attention.

This situation has changed rapidly. There came a wave of intranasal surgery, wide and important pathologic relations of the nose were discovered and a periodical literature regarding them has developed rapidly; many monographs were written, but systematic text books come more slowly, and the present volume more nearly represents a class of works, written for the student or the practitioner of other branches of medicine or surgery to give a broad, general view of its subject, than has heretofore been furnished in rhinology.

It deals with intranasal surgery on broad lines. It takes up successively, the anatomy, the chambers, atrophic rhinitis and miscellaneous conditions. Having dealt with these in six chapters, the next nine are devoted more to operative technic, beginning with the nasal septum and concluding with the maxillary sinus. Then a final chapter on "coronal head sections" goes back to the special anatomic relations

of the parts.

The illustrations with their legends, altho not printed on insert plates, occupy one hundred and fifty pages of the book. They consist largely of halftone reproductions of wash sketches representing anatomy of the parts, and the essential relations to be observed in the introduction and manipulation of instruments, and the placing of incisions, shaping of flaps, tissues to be excised, and new unions to be aimed at. These are represented by instruments held in place or outlines drawn on the half-tone reproductions of the anatomic details of the parts. A series of radiograms of the nasal cavities and connected sinuses, with probes, sounds and other instruments introduced into them in various positions, is a notable feature of the book.

An idea of the practical details brought out may be gathered from the fact that there are thirty-nine illustra tions in the part of chapter 6 devoted to submucous resection of the septum. The text is printed in large, clear type well leaded. An idea of the relative importance of text and illustrations is gained by noticing that the index of the book occupies a little over three pages, and the list of illustrations, in similar type, just twice that much space. We believe this work will be very helpful and suggestive in mastering the details of practical work.

E. J.

Applied Pathology in Diseases of the Nose, Throat and Ear, By Joseph Beck, M. D., F. A. C. S., Associate Professor of Laryngology, Rhinology and Otology, University of Illinois, College of Medicine. Cloth, 280 pages, 268 original illustrations and 4 plates in color. St. Louis, C. V. Mosby Co., 1923.

A book of fifty years ago, that was very widely read, by members of the medical profession in all lines of practice, and made a deep impression on their daily work and methods was, "A Handbook of Medical Treatment," by Milner Fothergill. It was read eagerly by the country practitioner. It was quoted and recommended by the professor of therapeutics in the university. It was not a systematic treatise or text book, but rather an attempt to express the philosophy of what the physician should do, or was doing. It gave an insight into how the skilled therapeutist thought about his cases, the observations that lead him to take a certain point of view, the reasons for which a certain remedy or association of remedies seemed to give or promise relief in a certain emergency.

Dr. Beck's book reminds us of Fothergill's. It is not a text book, it is not an exposition of pathology. It is an attempt to show how a knowledge of pathology may be made very useful in the management of cases of nose, throat and ear disease. As he puts it in the foreword: "the fundamental object in the analysis and management of a case is a definite knowledge of the underlying pathological change present." He further says: "It is my desire to limit this work almost

exclusively to my personal experiences and therefore it should not be considered as a text book. There will be many subjects that will not appear either because I have had no personal experience pertaining thereto, or because I cannot offer any data as to their pathology." "In the study of pathological changes, I have considered each subject as shown grossly in the patient during examination and further corroborated by laboratory data, as x-ray, etc., or during operative procedure or treatment; next, the gross specimen after removal, if such be the case, with subsequent microscopical examination. I have been fortunate in a few instances to have secured postmortem specimens."

The book is divided into Part I, Acute Diseases, and Part II, Chronic Diseases; in the former, seven chapters; in the latter, five. In the first part, the chapters deal in succession with the acute diseases of the nose, pharynx, mesopharynx, larynx, trachea, ear and mastoid. In Part II, the chronic diseases of the nasopharynx and oropharynx are considered together, those of the bronchi and esophagus are considered with the trachea, those of the mastoid in the chapter on the ear. In this book, too, the list of illustrations, over seven pages, is longer than the index, less than six; but the latter is ample. There is also a good table of contents, such as is often deemed sufficient without an index, in books published in continental Europe.

The illustrations consist chiefly in halftone pictures showing clinical conditions, and occasionally gross or histologic changes of disease. Most of them show very well what they are intended to show. Most of them are accompanied with appropriate legends, but some are not; and in a few instances, it is not entirely obvious what the picture is intended to show. The color plates are neat and clear. But the especial value of a color plate is to show the true colors of the thing represented; and this is not well done in those here employed. Color printers, entirely ignorant of the real colors to be reproduced and working with colors and processes not especially suited to the reproduction of the colors of tissues, often depart widely from the

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sketches to be reproduced and generally in a direction that exaggerates the de-

fects of the original.

This book is an excellent one to give the student of this special branch of medicine a broad comprehension of its field, and a model of how to approach and think about his cases. It is, therefore, particularly appropriate that the author dedicates it "To the future of Oto-laryngology and to my son, Joseph C. Beck, Jr." In explanation of the absence of borderline conditions and operative surgery from this work, the author says he has promised himself to write such books in the future; and that, in collaboration with others, a publication on radiography will appear later.

E. J.

## CORRESPONDENCE.

Dr. Worrell on Jequirity for Trachoma.

To the Editor: Dr. J. P. Worrell, who was the prominent Ophthalmologist of this section for some forty years, died at his home on February 22nd, after an ill-

ness of about three weeks.

During his illness he told me that he hoped to be able to get up so that he might leave a record of his experience in the treatment of Trachoma as well as the treatment of tear duct disease, and he planned to devote his time to that work. However, he later recognized that it was unlikely that he would recover and a few days before his death, when he was very weak and did not expect to live the day thru, he dictated the following brief note on the use of Jequirity in the treatment of Trachoma and requested that it be sent to you. As Ophthalmology is foreign to my work, he explained to me when talking of his plans, that Jequirity or Abrus Precatorious was introduced some forty years ago and hailed as a valuable remedy in the treatment of Trachoma. He stated that at that time Dr. Knapp of New York was the dominating figure in American Ophthalmology. At a meeting in 1884 Dr. Knapp condemned Jequirity saying that it caused exudation, and wherever exudation occurred cicatricial contraction followed; that consequently jequirity was too dangerous an agent to be

used. This stand of Dr. Knapp's caused jequirity to be abandoned generally.

Dr. Worrell was so weak when he dictated the following statement that he could only say a few words at a time; following a long pause he would be able to say a few more words, consequently a word has been supplied here and there, but the statement was almost unbelievably clear and grammatically connected.

His statement follows:

"I have had more experience with jequirity than anyone I know, and believe the profession in ignoring jequirity in the treatment of Trachoma is losing the most potent agency towards its cure. For forty years I have used it. I have had many most brilliant results, curing them absolutely, never having lost an eye or impaired the sight of one. Some years ago I asked the Philadelphia men why they failed to use the drug and they said they were afraid of it. In one or two instances only have I had real fear. In the last case the gravity of the inflammation resulted from using too strong a solution."

FORMULA.

"Crush ten grains of the bean and keep in cold solution for twenty-four hours in one ounce of water. The first day brush the eyes in the morning, at noon drop one drop, in evening the same. The next morning there will be more or less irritation and lacrimation, sometimes a little mucous secretion, but what you want particularly is a milk like exudation within the tissues and free of external exudation. The cornea will likely have a slightly hazy appearance. When the cornea is perfectly clear after the beginning of the treatment and the disease has been running a long time, I do not consider it a case of Trachoma. If the milky exudation in the tissues is found I feel safe in going on with the teratment and feel assured of a good result. Three days (9 times) finishes up the treatment."

"As to the corectness of the diagnosis; the whole body of the lid becomes swollen and tender. Turning, the lid the second morning is always painful. There is very little purulent secretion, it being more like mucus, and the chemosis of the eyeball does not seem serious. After running on until the third morning,

watch carefully and the chances are you caused lly. don't have to go further. This period of treatment is usually followed by irrihe dicgation with boric acid solution. hat he The swelling of the lids subsides very rapidly time: but what becomes very noticeable is a be able paleness of the bulbar conjunctiva requently sembling the appearance after the use there. believof adrenalin." nected.

A committee of the Terre Haute Academy of Medicine has been appointed to investigate the feasibility of going over Dr. Worrell's records and making case reports on the use of jequirity in Trachoma.

George T. Johnson, M. D., Terre Haute, Indiana.

# ABSTRACT DEPARTMENT

Reprints and journal articles to be abstracted should be sent to Dr. Lawrence T. Post, 520 Metropolitan Building, St. Louis, Mo. Only important papers will be used in this department, others of interest will be noticed in the Ophthalmic Year Book.

Van Dreil, B. M. Ocular Lesions of Leprosy. Tijdschr. v. Geneesk. Nederlandsch-Ind, 1922, v. 62, pp. 770-814.

Van Driel has made a systematic study of the anterior segments of the eyes of lepers in Sumatra. The patients come from two asylums in which the conditions are widely different. At Laos the patients are Bataks; and are agricultur-Amongst them syphilis, yaws, tubercle, trachoma, and gonorrhea are rare, whilst smallpox has been common and devastating. Owing to the fact that the Bataks have for generations been skilled in the diagnosis of leprosy, and have insisted on the segregation of lepers, this asylum contains a large number of slight, early and young cases. In the institution at Pulu, on the other hand, the patients are estate coolies, many of whom are Chinese, and syphilis and trachoma are rampant among them. Here, late and advanced cases are common, and young subjects are rare. The greatest care has been taken thruout the investigation to diagnose leprotic manifestations by the careful exclusion of other diseases, modern methods being consistently employed.

Madarosis was much commoner in Pulu than in Laos, owing to the cases of longer standing in the former institution. The upper lid is said to lose its lashes later than the lower; the eyebrows are affected before the lids. Comment is made on the frequent occurrence of an adventitious fold of the skin of the upper eyelid, which falls in front of and hides the lashes. It is suggested that this is due to the absorption of leprotic infiltrations leaving the skin over-

stretched and atonic. Other explanations are also offered. Ectropion of the lower lid is not uncommon as the result of chronic inflammation, but in the Bataks there is another common explanation of it, viz., fibrous retraction in the neighborhood of a fistula, in connection with the eyetooth; owing to the habit of filing off these teeth in youth.

Lepra bacilli have not been found in the tears. Leprotic scleritis is not uncommon, is often accompanied by iritis and keratitis; and apparently leads to perforation and impaction of uveal tis-Limbus infiltrations are common sue. and the cornea is often invaded by a characteristic "ivory-like pannus." Leprotic ulceration of the limbus is not uncommon. Van Driel is sceptical as to the specific nature of many of the corneal conditions usually attributed to leprosy, but makes an exception in favor of a form of superficial, punctate keratitis, which he found in three to four per cent of his cases. Iritis and iridocyclitis occurred in 14.5 per cent of the Pulu cases and in 22 per cent of the Laos cases. Small masses, occurring near the pupillary edge of the iris are not very infrequent, and may be lepromata.

Van Driel does not believe that the eye is invaded from the skin, but holds strongly that the infection reaches it thru the medium of the circulation. His estimate of only seven cases of absolute blindness as a result of leprosy in 1300 subjects shows how much milder the affection is in Sumatra, than in certain other parts of the world. He says that in that country most lepers die before they lose their sight. R. H. E.

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of ter ng, Howard, H. J. Eradication of Trachoma Among School Children in China. China Med. Jour.

Some interesting data concerning the geographical distribution of trachoma in China are brought out in the paper. The data was gathered during a residence of five years in South China and of four years in North China. The conclusions

are the following:

About fifteen per cent of the population of South China is infected with trachoma. The percentage is probably not more or possibly less in West China, but is undoubtedly greater in Central China, i. e. in the provinces bordering on the Yangste River. The infection gradually increases from south to north, insomuch that certain sections in the province of Chihli were found to have an infection of from 80 to 90 per cent of the population. Specific examinations of several different groups of people in this province are referred to, i. e. among several hundred coolies or unskilled laborers, the incidence of infection was 42.5 per cent; among more or less skilled mechanics, the infection was 26.8 per cent. Among the children of three orphanages, the infection ranged from 25.2 to 86 per cent. In several Chinese schools, the infection of the children ranged from 47.2 to 68 per cent. The inhabitants of three villages near the city of Paotingfu were all examined and the infection was found to vary from 79 to 90 per cent. In a total of about two thousand persons examined, including some of those referred to above, the incidence of infection was 58.3 per cent. In the province of Chihli, in which Peking is located, fully 60 per cent of all the cases that visit the eye clinics have trachoma or the sequelae of trachoma.

A conservative estimate of an infection of 40 per cent for North China, and of 30 per cent for the whole of China is given. This means that one hundred and twenty millions of people in China have trachoma, among whom are included thirty millions of children of school age.

Other rough estimates are given to the effect that fully two millions Chinese are blind in both eyes; five million more in one eye from various causes, including trachoma; and that the vision of twenty

million more has been so much reduced on account of trachoma that they are able to eke out the barest kind of an existence with only the greatest difficulty. Of all the factors that either continuously or at intervals (such as famines, flood, plagues and other diseases) act to produce great economic losses in China, trachoma is stated as being more important than any other single factor.

Methods and means of eradicating the disease are also discussed somewhat in detail, and the conviction is expressed that the problem is too big to be tackled by ordinary methods, and that the number of well trained physicians in China is still far too small to attempt, at present, any program of importance. It is pointed out that in facing such problems as trachoma in China, one is forced to the conclusion, on the one hand, that the healing of a few thousand cases each year is of no practical importance, except as a demonstration to secure and retain public favor; and on the other hand. that the establishment of a high grade school of hygiene to supplement the work of the ten medical schools that exist in China is essentially a first step inasmuch as the eradication of trachoma and other communicable diseases is distinctly a public health problem. Looking, therefore, at the problem as a whole, the training of specialists in the treatment of trachoma and other diseases of the eve must go hand in hand with the development of health education and health legislation in China.

H. J. H.

Lawford, J. B., and Neame, Humphrey. Binocular Choroidal Tuberculosis With Detachment of the Retina in Two Kittens. The British J. of Ophth., v. 7, pp. 305, 419, 1923.

Ophth., v. 7, pp. 305, 419, 1923.

The occurrence of blindness in cats is by no means common, and, as the result of binocular tuberculosis, is distinctly rare. The presence of tuberculosis in both eyes of each of two kittens of the same litter is probably unique. In one case the presence of the tubercle bacillus was demonstrated in the affected choroid of one eye. In the other case, in addition to the presence of tubercle bacillus in the choroid, this organism was found in abundance in a caseous mesenteric lymph gland, and in the spleen;

cultures of tubercle bacillus were obtained from bronchial and mesenteric glands; inoculation of a guinea-pig gave a positive tuberculosis result; and lesions of tuberculous nature were found microscopically in lungs, bronchial glands, spleen, large intestine, and mesenteric The most advanced stage of tuberculosis was found in the mesenteric It is probable that infection took place thru the colon. Altho no examination of the milk of the dairy supply was carried out it seems highly probable that the second animal at least was infected from cow's milk.

The bacteriologic report stated: "An emulsion of the mesenteric gland produced general tuberculosis in a rabbit, and cultures obtained from the lesions of the cat were typically bovine in cultural

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"Undoubtedly the infecting tubercle bacilli are bovine in type."

D. F. H.

Guillery, H. Toxic Tuberculoid Structures. Zeit. f. Tuberculose, 38, I.

In order to find out how far a latent tuberculous focus may take part in the development of an eye affection, Guillery studied the toxic action of incapsulated tuberculous matter in rabbits. For that purpose he introduced cultures of human and bovine tuberculus bacilli, enclosed in a bag of living membrane of the cavity of reed, which is impermeable for the bacilli but lets thru their toxins, into the peritoneal cavity. There were no clinical symptoms, only anatomic changes found at the autopsies after months, viz., of the liver and the whole omentum. They consisted in infiltrations even of the remotest parts with epithelioid cells, lymphocytes and giant cells of all types, especially of Lang-hans. These experiments place the pathogenesis of the socalled tuberculous processes poor in bacilli on a new basis. They prove that the toxin of the tubercle bacillus, separated from its bearer, spreads into the surroundings and produces at distant places tuberculous structures, but apparently no caseation. On account of this difference Guillery calls them tuberculoid. Whether the eye may participate in these changes requires further experiments, which have been begun by the author.

Schall, E. Gonorrheic Abscess of Lids and Fatal Meningitis After Ophthalmia Neonatorum. Klin. M. f.

Augenh., 1922, v. 69, p. 597.

A boy, born April 5, 1922, was admitted May 21, 1922, on account of intense swelling of the left eye, which had suddenly developed in the course of ophthalmia neonatorum on the road to recovery. Both lids of the right eye were very red and swollen, forming a globular tumor. Ocular conjunctiva slightly injected, not chemotic. No fluid from the tear points upon pressure, but purulent secretion from right nostril. Punctures of the conjunctival surface of the temporal portion of the upper lid evacuated creamy pus from a large cavity, at the region of the lacrimal gland. A smear showed abundant gonococci, mostly intracellular in typical arrangement. Incision of the skin and conjunctiva were repeated. June 4, there were sudden convulsions. Meningitis. Lumbar puncture did not show increased pressure. Death on June 5.

There are two paths for the convergence of gonococci to the meninges:
(1) By the way of the blood stream.
(2) Thru the emissaries of the orbital bones directly to the meninges, or possibly from the nose. No autopsy could

be made.

The cases of gonorrheic lid abscess and dacryoadenitis, so far published, were all metastatic, originating in urethral gonorrhea, so that the present case is the first brought about in this unusual manner.

C. Z.

Keegan, J. The Technic and Reaction of Intracranial Mercuric Bichlorid Injections. Brit J. Ophth., v. VII, No. 11, 1923, p. 522.

The first five injections in this series of twenty-four intracranial injections of mercuric bichlorid, in Gifford's six cases, were made into the anterior horn of the right lateral ventricle, thru a trephine opening. Thru a blunt graduated needle ten cubic centimeters of fluid were removed. To five c. c. of this fluid were added three to five drops of 0.5 percent mercuric bichlorid. The medicated cerebrospinal fluid was reinjected by gravity method.

The inconvenience of this method

made it desirable to use a less difficult route. Cisternal puncture was decided upon, it being comparatively safe in careful hands. An eighteen gauge lumbar puncture needle is inserted in the neck, directly over the prominent spine of the second cervical vertebra. The needle is directed upward at an angle of forty-five degrees, piercing the occipito-atlantal ligament between the occipital bone and first cervical vertebra, the point entering the cisterna magna between the cerebellum and medulla. The needle enters from four to six centimeters depending upon the thickness of the neck. It should have a guard to prevent injury of the me-

Twenty-five c. c. of spinal fluid is syphoned, ten saved for serologic examination and the remainder allowed to reenter the cisterna by gravity.

In most cases there is an almost immediate reaction, severe frontal and occipital headache, nausea, vomiting, which persists for a few hours. Moderate shock, temperature elevation of one or two degrees. Within twenty-four hours the patient leaves the hospital. The cisternal injection is not only more convenient but the medicated fluid enters a point considerably nearer the optic tract.

A diagram of the method together with a table of the twenty-four injections accompany the contribution.

DEH

James, R. R. Ophthalmologic Notes from the Postmortem Records of St. George's Hospital, London, 1841-1921. The Brit. J. of Ophth., v. 7, p. 313, 1923.

This is an interesting review of the findings obtained from an unusually complete series of records covering a period of eighty years. The series began in 1841, and since that time nearly 28,000 deaths have been recorded, two-thirds of which underwent a partial or complete postmortem examination.

The series contained injuries such as ruptured globe and gun shot wounds, conjunctival disturbances, corneal ulcers and opacities and old iritis. Cataract is mentioned four

times. Benign and malignant growths of the choroid, chroiditis, and in 1888 tubercle is first mentioned. Twentythree cases of choroidal tubercle are noted. Albuminuric retinitis is spoken of thirty-three times, hemorrhage in renal disease seventeen. Hemorrhage is also noted in anemias, pneumonia. meningitis, etc. One case of detachment of the retina was recorded. Orbital abscess and malignant disease was noted. Two cases of exophthalmus were noted in Graves' disease thus disproving the theory that exophthalmus does not exist after death. One case of tetanus following an eve injury is interesting in that one is led to speculate upon the probable existence of a focus of infection other than the eye injury.

Sichel, W. S. and Fraser, A. Hemianopia in Untreated Secondary Syphilis. Brit. J. Ophth., v. VII., No. 11, 1923, p. 525.

The authors discuss to some extent certain phases of cerebrospinal syphilis. Involvement of this structure is an early manifestation as many cases of syphilis in the secondary and primary stage show definite biologic and cytologic evidence of intrathecal involvement. There is much evidence to show that the spironema in the new host flourishes best in tissue from which it originally was derived. Some distinguish two strains-one dermotrophic and other neurotrophic. Dominating cerebral manifestation is rare in the early stage of syphilis, even when the strain is believed to be neurotrophic. Where the strain is not neurotrophic, any cerebrospinal manifestations usually occur while the cutaneous lesions are in evolution or resolution.

Cerebrospinal lesions are either a meningo-lympho-vascular type, such as gummatous and endarteritic processes, or a parenchymatous nervous disease, characterized by primary degeneration of specialized nerve cells. The latter is due to a direct action of the toxin upon the nervous structure. The optic nerve is usually secondarily affected, yet certain forms of primary

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A male, aged 29 years, developed a hard chancre with no other evidence of syphilitic infection. He received no treatment, being far from medical aid. About four months later he consulted the authors. His only complaint was that when reading he had to turn his head to the right in order to see words. General examination, negative; Wassermann 4+; vision R. 5/36; L. 5/5; accommodation R. +6; L. +7; muscle balance, tension and pupil reaction normal. Wernicke's hemiopic reaction could not be elicited. Lids, corneae and fundi normal. Fields: no scotomata, right homonymous hemianopsia, the line of demarcation passing to the right of fixation.

During the ensuing month active antiluetic treatment was instituted. The fields practically recovered. no time did systemic or nervous symptoms develop. D. F. H.

Barrett, Sir James. Vision of Railway Servants. The British J. of Ophth., v. 7, p. 329, 1923.

Dr. Leonard Mitchell's communica-

tion in the July, 1923 British Journal of Ophthalmology, in which Sir James Barrett's report of Feb. 12, 1898 is referred to, raises a number of problems to which the author draws attention. The distance at which the semaphore can be recognized depends on the background, atmosphere and color. 2. While the semaphore arm subtends an angle of five minutes lengthways and one minute in width, yet, it cannot be regarded as an ordinary test object since it is really an opaque object on a light ground. Secondary color defect simply reduces the distance at which colored light can be recognized at night. 4. If men are to be admitted to Railway Service with vision of 6/12 there must be some ascertainable reason; usually error of refraction. As men grow older their vision will deteriorate. 5. The standards adopted in the Pilot Service seem to be satisfactory. The men entering the service must possess 6/6 vision; and they are not disqualified so long as they possess 6/12 fully in each eye.

D. F. H.

# NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. George H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph L. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn.; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. Edward D. LeCompte, Salt Lake City.

## DEATHS.

Herman W. Schelman, Pittsburgh, died February seventh, aged seventy-five.

Dr. Otis Orendorff, Canon City, Colorado, aged fifty-three, died February fifth of pneu-

Dr. H. Köllner, professor of ophthalmology at Wurzburg, died recently, aged forty-three.

Prof. Hilario de Gouvea, of Rio de Janeiro, died October twenty-fifth, 1923, at the age of eighty-nine.

Dr. Frederick N. Bigelow, Providence, Rhode Island, aged thirty-eight, died Feb-

ruary fourteenth, following an operation for gastric ulcer.

#### PERSONAL.

John Wharton has been appointed Hon. Ophthalmic Surgeon to the Manchester Royal Infirmary.

Dr. Joseph A. Andrews, of Santa Barbara. California, was married on March third to Mrs. Margaret Knight Forsyth.

Dr. and Mrs. A. B. Middleton of Pontiac, Illinois, returned from their winter home in Clermont, Florida, March tenth.
Dr. Fred M. Spalding, of Boston, has been very ill with a septic infection, but is slowly

recovering his health.

Dr. W. Holbrook Lowell, of Boston, has been appointed Ophthalmic Surgeon at the Massachusetts Charitable Eye and Ear Infirmary.

Arthur D. Griffith and F. A. Williamson-Noble have been appointed Ophthalmic Sur-

geon and Assistant Ophthalmic Surgeon respectively to the Westminster Hospital.

Dr. Walter B. Lancaster, of Boston, has resigned as Ophthalmic Surgeon at the Massachusetts Charitable Eye and Ear Infimary, and has been appointed Consulting Surgeon at that institution.

Dr. George S. Derby, of Boston, has been appointed Williams' Professor of Ophthalmology at the Harvard Medical School, and Ophthalmic Chief of Service at the Massachusetts Charitable Eye and Ear Infirmary.

In a letter from Dr. W. A. Fisher of Chicago, en route home from his trip to India,

he states that in the four weeks, or twenty-four working days he spent in Shikarpur, he operated on 865 cataracts, besides a lot of other eye operations. On one day he did 110 cataract operations, and 70 on the fol-

llo cataract operations, and 70 on the following day.

Dr. Alexander Quackenboss, of Boston, has resigned as Williams' Professor of Ophthalmology at the Harvard Medical School. He has also resigned as Chief of the Ophthalmic Staff at the Massachusetts Charitable Eye and Ear Infirmary and has been appointed Consulting Surgeon at that institution. A dinner was tendered Dr. Quackenboss at the Harvard Club on February 25th, 1924, by the Trustees of the Infirmary, the Staff paticipating, in recognifirmary, the Staff paticipating, in recogni-tion of his long and untiring sevice of thirty years at the Infirmary.

#### SOCIETIES.

At the annual meeting of the Milwaukee Oto-Ophthalmic society held January 16th, Dr. Franz Pfister was elected president, and Dr. William E. Grove, vice president, and Dr. Jeffrey J. Brooks, Jr., secretary-treas-

The Tulsa Academy of Ophthalmology ond Oto-Laryngology held its annual meeting March 17th and elected the following officers: President, J. Walter Beyer; vice president, R. N. Smith; secretary-treasurer, W. A. Huber.

The Annual Congress of the Ophthal-mological Society of the United Kingdom will be held at Glasgow, May 1, 2; and 3, 1924. The subject for discussion will be "The Physiology and Pathology of the Pupil Reactions" Pupil Reactions.

The Colorado Ophthalmological Society celebrated its twenty-fifth anniversary March 15, 1924 with an anniversary dinner at the University Club, Denver. Congratulations were sent to it by the New England Ophthalmological Society land Ophthalmological Society.

At its regular meeting, Monday, March 17, the Chicago Ophthalmological Society passed by unanimous vote a resolution that its members should not broadcast any of the technical details of ophthalmology, and

that any broadcasting should not be accompanied by the name or appointments of the member, violation of either provision to be construed as a breach of medical ethics. will

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At the meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia, held March 19, 1924, the fol-lowing papers were read: "Accommodation in Myopia" by Dr. Howard F. Hansell; "Industrial Compensation in Pennsylvania for Ocular Injuries" by Dr. W. M. Sweet; "Exhibition of a Case of Traumatic Pulsating Exophthalmos" by Dr. William Zent mayer; "Exhibition of a Case of Mikulicz's Disease" by Dr. John P. O'Brien (by invitation).

At the meeting of the Section of Ophthalmology of the New York Academy of Medicine, held March 17, 1924, the following papers were read and discussed: "Lymphomatosis of the Conjunctiva" by Dr. Julius Wolff; "Bazin's Disease with Ocular Manifestations" by Dr. Ben Witt Key; Symposium on Anesthesia in Ophthalmic Practice: a. "Local Methods" by Dr. R. G. Rees; b. "General Anesthesia" by Dr. J. T. Gwathmey: "Infiltration and Block Anesthesia" by mey; "Infiltration and Block Anesthesia" by Dr. J. M. Robison (by invitation).

Thirty-seventh Congress of "la Française d'Ophtalmologie" will The Société Francaise d'Ophtalmologie" will take place at the "Faculté de Médecine de Paris" on May 12 and following days. The usual report will be presented by Dr. Camille Fromaget (de Bordeaux) on the "Troubles oculaires d'origine dentaire"; and an address will be given by Dr. G. E. deSchweinitz of Philadelphia, invited guest of the Society. A hearty invitation is sent to the American ophthalmologists to accompany to Paris the President of the Congress of Washington. For particulars apply to Dr. René Onfray, Secrétaire Général, S.F.O., 6, Avenue de La Motte-Picquet, Paris (7).

#### GRADUATE COURSE.

A two weeks' intensive course on ophthalmology and oto-laryngology, similar to the one given last year, will be given in Denver, July 21 to August 2, inclusive. It will include lectures by men of international reputation and daily demonstrations and clinics given to small sections of the class. The detailed announcement may be obtained by addressing Dr. William C. Finnoff, 217 Imperial Bldg., Denver, Colo.

In order to accommodate a large number of applicants who could not be included in last year's class, Prof. Vogt announces a course in the slit lamp, combined with demonstrations of the fundus with the red free light, to be held from the 1st to the 6th of September, 1924. The programme is similar to that of last year. The number of participants is limited. Applications should be made to Professor Vogt, Universitäts-Augenklink, Zürich, Switzerland.

The Third Annual Graduate Course in Oto-Laryngology to attend the clinic of Prof. Neumann in Vienna will be conducted as last year by Dr. Mackenzie. The class will leave New York, June 14 and return about August 16. Duing the five weeks in Vienna, the classes will be given from 7:30 A.M. to 10:00 P.M. There will also be three hours of lectures on otology daily on the steamer. The class will be divided into sections, and one of these will be able to spend one-half, or more, of its time on ophthalmology.

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Under the will of Thomas D. Hurst, the Brooklyn Home for the Blind was left \$5,-

The New York Institute for the Blind received \$50,000 by the will of Miss Reading Sterritt.

A conference is to be held soon at Madrid, to discuss means for improving the condition of the blind.

According to the Chicago Health Commissioner, of 158,826 Chicago school children examined last year, 26,390 had defec-

tive vision.

Lady Tweedy has presented to the Museum of the Royal College of Surgeons some instruments used by her late husband, their designer, among which are his optometer for estimating the degree of astigmatism and other errors of refraction. They will form an instructive addition to the section of ophthalmic instruments, which already includes several employed in practice

by their inventors, Beer, Guthrie and Tyrell.

The Ophthalmic Service at the Massachusetts Charitable Eye and Ear Infirmary has been reorganized. One half of the Infirmary out patient service, namely the Monday, Wednesday and Friday clinics, is to be a teaching service; and will be designated as the "service continuous throughout the year." This service will have approximately one-half the eye beds in the house. The other part of the clinics and half of the beds will be taken care of by three Ophthalmic Surgeons for periods of four months.

A laboratory for the investigation of trachoma has been inaugurated by the U. S. Public Health Service. Ida A. Bengston of the hygienic laboratory of Washington, D. C., will have charge of the work. Headquarters will be maintained in the bacteriologic laboratory, department of hygiene, of the Missouri School of Mines and Metallurgy. The work is to be associated with the Trachoma Hospital maintained in Rolla, Missouri by the Public Health Service.

Missouri, by the Public Health Service. The annual report of the National Institute of the Blind (England) reports the expenditure last year of a sum in salaries, wages, etc., amounting to nearly \$350,000 to 332 blind employees engaged actively in the Institute's work. The majority of the collecting staff are blind; proofs are corrected by them; music is prepared by trained blind workers; and practically the entire work of the home teaching branch is carried on by blind workers. Several of the most important executive positions are held by blind persons. The principle of employing the blind to care for the blind is characterized by marked success, and largely aids in the solution of the problem of unemployment.

It came out very clearly at the Departmental Committee in 1910 that bad lighting is the cause of a great many accidents. Men stumble in passages and gangways and they may easily do themselves serious harm, especially if there should be scrap metal lying about. Whilst the Home Office has no power to prescribe adequate lighting in ordinary cases, it may do so where there is danger to life or limb; it is prescribed for about half a dozen industries where the dangers are most obvious—e.g., ship repairing. The next Factory Act is almost certain to require "adequate lighting" as a general provision, and, moreover, power will be given in all probability for the requirement by special order of definite standards of illumination, measured in foot-candle, in different industries. Later on it is possible that a minimum illumination may be prescribed for different processes. Lancet, Feb. 16, 1924, p. 355.

In the February News-Letter of the National Committee for the Prevention of Blindness, it is said that one out of every ten children in the public schools of the United States is handicapped by defective vision. Since January first they have received reports of thirty-two children shot in the eye by air-rifles, and it is highly probable that these thirty-two constitute only a small proportion of these accidents. The writer knows of one case that is not on this list. It is high time that some national legislation be enacted against the manufacture of this very dangerous plaything. The report of the Department of Labor and Industry of Pennsylvania since its foundation in 1916 shows the number of eyes lost from accident to be 4,556 with a compensation award of \$6,000,992. The loss of eyes is far in excess of loss in any other part of the body, hands coming next with a loss of 1,950; feet, 1,026; legs, 774, and arms, 584.

# Current Literature

These are the titles of papers bearing on ophthalmology. They are given in Eng-These are the titles of papers nearing on ophthalmology. Iney are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in heavy-faced type. The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to American Journal of Ophthalmology, 217 Imperial Build. ing, Denver, Colorado.

#### BOOKS.

Alexander, G. F. Principles of ophthalmoscopy and skiascopy. 72 pp., 30 ills., London, J., and A. Churchill, 1923. Med. Press, 1924, Feb. 13, p. 141.

Axenfeld, T. Handbuch der ärztlichen Er-

fahrungen im Weltkriege, 1914-1918. Bd. V Augenheilkunde, 261 ills., some colored, 4 plates. Leipzig, Barth, 1922. Zeit. f. Augenh., 1924, v. 52, p. 125.

Bailliart, M. P. La circulation retinienne a

l'etat normal et pathologique. 412 pp., 51 fig., 4 colored plates. Clin. Opht., 1924, v. 28, p. 56.

Bing, R. Gehirn und Auge. Munich, Bergmann, 1923. Zeit. f. Augenh., 1924, v. 52,

Dally, J. F. H. High blood pressure. 140 pp., 23 ills., London, William Heinemann, 1923. Brit. Jour. Ophth., 1924, v. 8, p. 90.

Druault-Toufesco, S. Notes sur la myopie. 118 pp., 18 ills., A. J. O., 1924, v. 7, p. 243. Elschnig, A. Die Funktionsprüfung des Auges. Third edition. Vienna, Franz Deutike, 1923. Zeit. f. Augenh., 1924, v. 52, Die Funktionsprüfung des p. 126.

Disease in captive wild mammals and birds. 665 pp., 47 plates, Philadelphia,

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